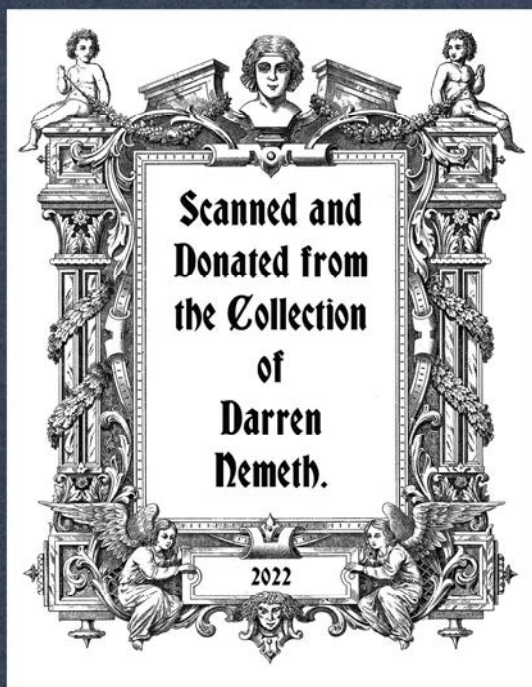
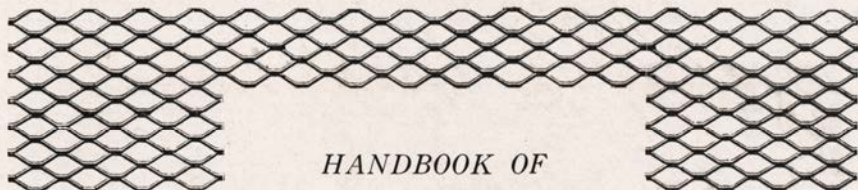


Fire - Proof Construction

using
Kno-Burn
METAL LATH





HANDBOOK OF
FIRE-PROOF CONSTRUCTION

USING

Kno-Burn
TRADE MARK

EXPANDED METAL LATH



Metal Lath Because Metal Lasts

Due acknowledgment is made of courtesies received from the Radford Architectural Company, Atlas Portland Cement, Norwalk Vault Company and others.

North Western Expanded Metal Company

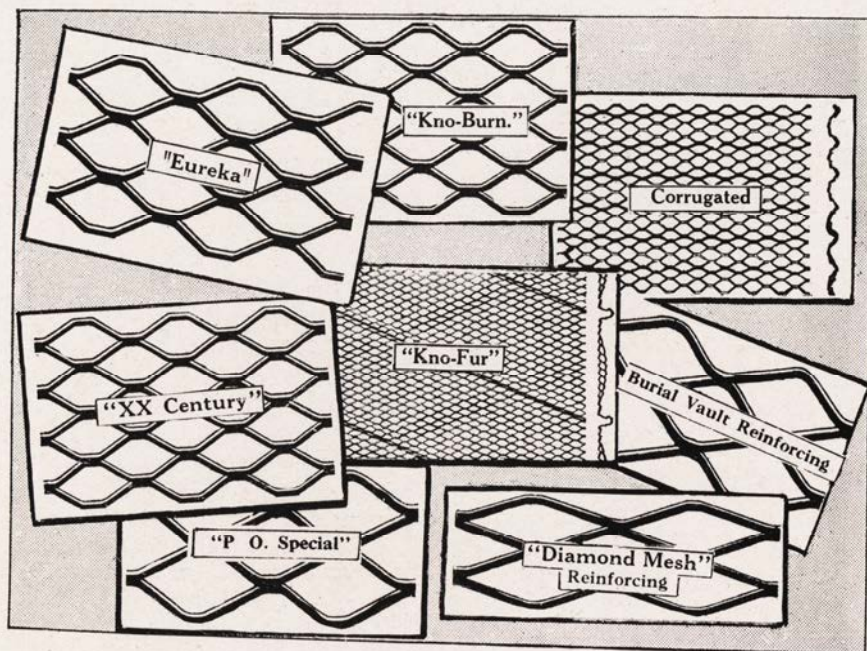
Manufacturers of NEMCO Products

Main Offices

Old Colony Building
CHICAGO
U.S.A.

Works at
CHICAGO, ILL.
JEANNETTE, PA.

Branch Offices
BOSTON, LOS ANGELES
NEW YORK



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The Growing Need for Fire Resisting Construction

THE Fire Departments of the United States have no peer either in excellence of equipment or on the point of personal efficiency. Yet despite this our annual fire loss per capita is larger than that of any other country in the world.

Last year our national bill for fires was nearly \$230,000,000, that of 1916, \$214,000,000 and of 1915, \$172,000,000—an appalling and worse—a yearly increasing sum. It is plain therefore, that if this huge economic waste is to be stopped together with its distressing attendant loss of life that we must build to **prevent fire**, rather than to place all our dependence on costly and often inefficient methods of fire extinguishment.

**Not "Who Paid for It,"
But "Who Built It."**

Herbert Hoover has said "The time will come when people will ask not who paid for a thing, but **"Who built it,"** then much of the real onus of responsibility for destructive conflagrations will devolve on the shoulders of the architect, the contractor or the engineer.

For signs are already not lacking to prove that the public is slowly but surely awakening to the fire peril and to the realization that it can most effectively be minimized by the more general use of fire resisting construction.

Of the various types of construction that have demonstrated ability to successfully resist fire, the most economical and generally satisfactory is a non-

combustible plastic covering such as cement plaster, gypsum plaster or stucco on a fire resisting base of Metal Lath. No other combination of materials offers in the same degree, the advantages of fire protection, permanency, low initial and maintenance cost, quick erection, and in the case of stucco, such beauty and architectural adaptability.

The Modest Home Is Made More Permanent, More Attractive, and Its Safety Increased by the Use of Metal Lath.



A Picturesque Stucco-Metal Lath Villa



NORTH WESTERN EXPANDED METAL CO. CHICAGO, ILL.



"Kno-Burn" is used in practically every type of Residence Construction.

What Is Metal Lath?

Metal lath is a metal fabric designed as a base on which is to be applied any plastic covering for walls or ceilings. Expanded metal lath is a material manufactured from sheet steel of various gauges, depending upon the class of work on which it is to be used. The sheets of steel are slit and then expanded or opened out so as to form a network of meshes. Metal lath is made in sheets from 18 to 24 inches wide and eight feet long. This length permits the use of the lath on either 12-inch or 16-inch centers. Metal lath is also used very extensively as a base for exterior plastering or stucco work.



A Metal Lath and plaster partition which successfully withstood a very severe fire

Function of Metal Lath.

The primary function of metal lath is to provide a permanent, fire resisting supporting base for the outer plastic covering. It must therefore be of such a nature and its openings so shaped as to afford a perfect "key" for the plaster, and that there be sufficient distribution of metal per square yard to guarantee proper reinforcing strength.

Since its invention in 1865 by a Frenchman—Monsieur Lambot—it has passed through a developing process in which, one by one, the flaws of the earlier types have been gradually eliminated until in "Kno-Burn," we have a material which is well calculated to give the greatest possible measure of satisfaction in all types of building for which its use is indicated.

Prevents Plaster from Cracking and Falling.

Cracking or falling of plaster is usually due to the expansion or contraction of the lath, which action breaks the "key" or clinch of the plastic covering permitting it to crack and fall.

"Kno-Burn" Metal Lath absorbs no moisture from the fresh wet plaster, hence does not swell, then dry out and later on draw away from the plaster. "Kno-Burn" has practically the same co-efficient of expansion and contraction as the plaster. The extent of the movement due to temperature changes being thus practically the same in both materials, the walls remain indefinitely smooth, firm and slightly.

Eliminates Unsightly Streaks or Discolorations.

"Kno-Burn" Walls and Ceilings dry out quickly and evenly. There are no excretions from the metal to stain the plaster—no unsightly alternating light



The Use of Metal Lath Would Have Prevented These Unsightly Streaks and Discoloration

and dark streaks, such as are so often noticeable when wood lath is used. Furthermore the decorations can be applied directly to the finish coat of plaster doing away with the necessity of leaving them in an unfinished state for weeks or even months as was formerly considered necessary.

In libraries and other public buildings also in the better class of residences where wall decoration is paid particular attention, the use of any less perfect backing than "Kno-Burn" is out of the question, since cracks or stains are particularly noticeable in walls of fine texture and delicate coloring.

Saves Valuable Space.

Much valuable space can be saved in office buildings, hotels, theatres, and similar structures by using metal lath for all non-bearing partitions. It is

possible thus to construct fireproof partitions of but 1½ to 2½ inches thick whereas if other materials were used the thickness would be from 4 to 6 inches.

This not only saves space but materially lightens the dead load that must be carried by the structural members of the building—an important item on big jobs.

For Interior or Exterior Work.

Kno-Burn is equally satisfactory specified for exterior plastering or stucco work, or for interior work,—walls and ceilings, partitions, stairs and elevator and beltway enclosures, etc. Its use effects a distinct economy whether in the construction of a modern cottage or a million dollar skyscraper.



Actual Size of "Kno-Burn" Mesh

Easily and Quickly Handled—Saves Plastering Materials and Labor.

"Kno-Burn" is easily formed around openings, corners or angles or bent to any desired shape without breaking the strands. It is readily cut with a pair of ordinary trimmers' shears, because of the uniformity of the strands and the absence of any ribs or heavy pieces of metal.

The practically smooth surface of the lath facilitates the rapid application of the plaster. And the small mesh saves waste of plastering materials, one-fourth less "mud" being needed than that required for some larger types of mesh.

Stock Sizes, Weights and Finishes of "Kno-Burn"

No.	Finish	Width of Sheets	Length of Sheets	Sheets per Bundle	Yards per Bundle	Weight per Bundle	Weight per Sq. Yd.
24-ga.	Painted.....	18"	96"	9	12	40.8 lbs.	3.4 lbs.
	Painted.....	24"	96"	9	16	54.4 "	3.4 "
	Cut from Galv. Sheet.....	18"	96"	9	12	40.8 "	3.4 "
	Galv. after Cutting.	18"	96"	9	12	48.0 "	4.0 "
25-ga.	Painted.....	18"	96"	9	12	36.0 "	3.0 "
	Painted.....	24"	96"	9	16	48.0 "	3.0 "
26-ga.	Painted.....	18"	96"	9	12	30.0 "	2.5 "
	Painted.....	24"	96"	9	16	40.0 "	2.5 "
	Cut from Galv. Sheet.....	18"	96"	9	12	33.0 "	2.75 "
	Galv. after Cutting.	18"	96"	9	12	36.0 "	3.0 "
27-ga.	Painted.....	18"	96"	9	12	28.0 "	2 1/3 "
	Painted.....	24"	96"	9	16	37 1/3 "	2 1/3 "

"Kno-Burn" Endorsed by Leading Builders.

"Kno-Burn" Metal Lath is the result of ceaseless laboratory experimenting and years of practical use. It meets every requirement of both owner and builder as a practical economical metal lath. The strands of its small, uniform diamond shaped openings have a slight downward dip or slant. This is a distinct advantage since it permits the plaster to flow down over and around each strand, thus completely embedding the lath. Yet at the same time the small mesh insures the perfect "keying" of the plaster.

About Sizes and Finishes.

Kno-Burn is furnished in stock size sheets 18 inches wide by 96 long, which can be most conveniently handled by the workmen, cover a maximum amount of space and facilitate wrapping and shipping. It can also be had in a special 24 inch width if desired packed 16 yards to bundle. All gauges of "Kno-Burn" are furnished painted with either a high grade asphaltum or carbon paint, which ever preferred—the carbon paint however being the more desirable, and well worth the small additional cost. Nos. 24 and 26 gauges are furnished cut from galvanized sheets.



"Kno-Burn" was used throughout the interior plastering of the Oklahoma State Capitol Bldg.

Advantages of "Kno-Burn" Expanded Metal Lath.

- Rigidity with a minimum amount of steel.*
- As small a mesh as will permit a perfect "key."*
- A mesh so shaped that it will imbed in the plaster.*
- A material that can be easily cut or shaped.*
- A type of mesh that can be rapidly and cheaply manufactured.*
- A size of sheet that can be easily applied.*
- A mesh that will require a minimum of plaster.*

"Kno-Burn" metal lath is sufficiently rigid for all practical purposes. The number 24-gauge will be found amply strong for use on wall with supports spaced 16 inches on centers, and for ceilings with supports spaced 12 inches on centers. For use on work where the centers are spaced more than these, we recommend the use of our "Kno-Fur" lath, described on pages 52 and 53. Number 24-gauge "Kno-Burn" weighs 3.4 pounds per square yard, which is the least weight of steel possible to use and secure a rigid material.

Stocks of "Kno-Burn" in All Principal Cities.

Adequate supplies of "Kno-Burn," "Eureka," "Twentieth Century" and "Corrugated" Metal Lath and other Nemco Products are at all times within easy reach of every one. Because of our coast to coast representation and exceptional facilities for distributing our products, the North Western Expanded Metal Company is in an unusually favorable position to supply every need.

The Services of Our Engineering Department Always Available.

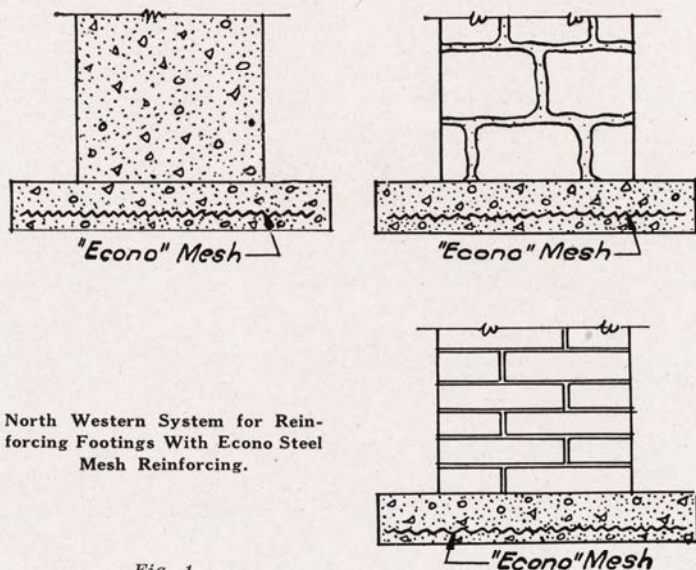
We gladly furnish any desired information regarding the use or application of "Kno-Burn" or others of the Nemco Products and our Engineering Department will cheerfully render every assistance to architects, contractors, etc.

The Importance of Proper Foundations

A HOUSE can be no stronger than its foundation. Therefore to assure permanently satisfactory results either in stucco residence building or in the erection of larger and heavier edifices as factories, etc., it is imperative that the foundations be given as careful consideration as the superstructure.

Ofttimes unsightly and even serious cracking of stucco walls and other similar annoyances are directly traceable to faulty foundation work. Hence any movement of the foundation will be sure to result in damage to the finished work.

It is apparent that this part of the structure has a two fold office—it must possess sufficient stability to not only carry and evenly distribute the forces to the bed of foundation, but also resist the action of the sub soil. It is essential therefore that the foundations be of sufficient size and strength to properly sustain the load and prevent uneven settlement. Care should be taken to ascertain in advance if there are any local conditions of the soil, etc., which may require special precautionary measures.



North Western System for Reinforcing Footings With Econo Steel Mesh Reinforcing.

Fig. 1

As a precautionary measure the plans should be rechecked before construction commences to see that all projections for cellar entrances, outside chimneys, etc., have been duly allowed for.

Incidentally in residence construction where open fire places are indicated, it should be ascertained that these are large enough to hold the necessary flues. (Frequently the furnace flue is run in the same chimney with that of the open fireplace.)

The wall or pier carried to the foundation bed may be either of stone, rubble masonry, brick or concrete, the latter being preferable, since depressions can thus be filled more readily than with any other material. It should extend to at least 4 feet below surface of ground. If reinforced concrete is used for the

footings, it will reduce the depth (saving material) about one-quarter and at the same time give a more equable distribution of loads. This form of construction therefore offers definite economies due to reduced section and the greater rapidity with which it can be placed. It is also best adapted to resist tensile stress.

Footings are not always easily accessible. To expedite the work, therefore, a type of reinforcing should be selected which can be readily handled and placed. Practice has proven that this is preferably of sheet form, with close spacing of members and of such design as to take care of initial stress.

Econo Expanded Metal ideally meets these requirements. It is furnished in flat sheets cut to the desired size and assures an equable distribution of steel and can be properly placed with a minimum amount of trouble and labor.

Econo is also much in demand for foundation work on heavier construction, its use frequently simplifying construction problems which would otherwise present considerable difficulties.

NOTE.—For a more complete discussion of foundations, readers are referred to "Designing Data," a copy of which we are glad to send without charge.

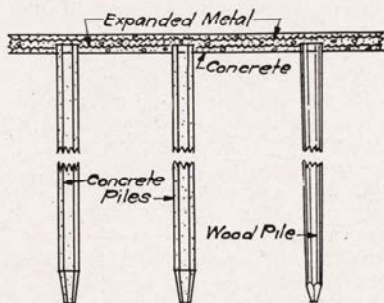


Fig. 2

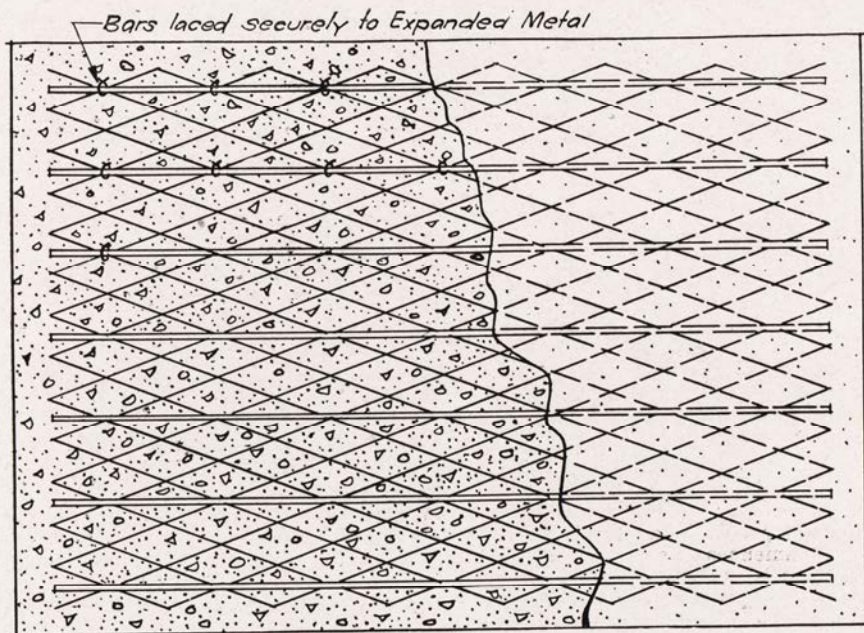


Fig. 3

An economical system of reinforcing for footings. Note how the bars are tied to Econo mesh. Large concerns using standard drawings have definite specifications on reinforcing. This system was devised to meet such requirements (where increased sectional area is required) as the Econo can be cut to required size and the bars laced to it in advance so that when these units reach the site of the job, there is no possibility of mistake and the greatest possible area is covered in a minimum amount of time.

Eureka Metal Lath

Especially Adapted for Work Not Requiring a Small Mesh Lath.

The Mesh of our "Eureka" lath is slightly larger, but otherwise similar in shape to the famous "Kno-Burn." It is a very economical lath, since the increase in the size of the mesh reduces the amount of steel used, thus materially lessening the cost.

Yet this saving is not at the expense of quality since the strands of the meshes are the same width, so that the material retains its full strength. Furthermore "Eureka" is manufactured from full United States standard gauge sheets, as are all the other Nemco Expanded Metal Products.

Economical—Satisfactory.

"Eureka" can be used with distinct economy on many types of plastering work for which a small mesh lath is not required. This is particularly true in the case of solid plaster partitions, for if there is an excessive amount of plaster shoved through the lath, it only serves to build up the first coat that must of necessity be placed on the reverse side of the lath.



Actual Size of "Eureka" Mesh

"Eureka" has and is being used with great satisfaction on a very large number of important buildings.

Sheets 1-inch wider and longer than listed.

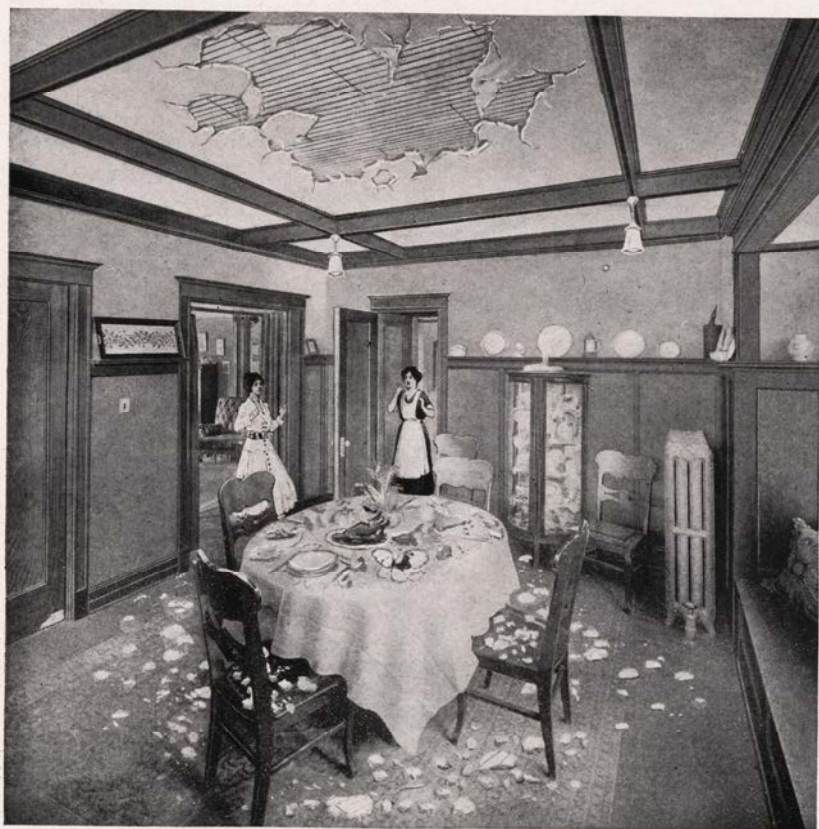
A feature of particular interest to the contractor is that the sheets of "Eureka" lath are furnished 1-inch wider and longer than the stock sizes given in the table below, although the material is always billed in accordance with the sizes given here. This allows for the material used in making the necessary laps at sides and ends of sheet.

All gauges of "Eureka" are furnished painted with either asphaltum or carbon paint. We recommend the latter.

NORTH WESTERN EXPANDED METAL CO., CHICAGO, ILL.

Stock Sizes and Weights of "Eureka" Lath.

No.	Finish	Width of Sheets	Length of Sheets	Sheets per Bundle	Yards per Bundle	Weight per Bundle	Weight per Sq. Yard
22-ga.	Painted.....	22"	96"	9	14 $\frac{3}{8}$	49.8 lbs.	3.4 lbs.
	Cut from Galv. Sheet.....	22"	96"	9	14 $\frac{3}{8}$	58.6 "	4.0 "
	Galv. after Cutting.	22"	96"	9	14 $\frac{3}{8}$	63.7 "	4.35 "
24-ga.	Painted.....	22"	96"	9	14 $\frac{3}{8}$	41.04 "	2.8 "
	Cut from Galv. Sheet.....	22"	96"	9	14 $\frac{3}{8}$	41.79 "	2.85 "
	Galv. after Cutting	22"	96"	9	14 $\frac{3}{8}$	47.66 "	3.25 "
26-ga.	Painted.....	21"	96"	9	14	30.8 "	2.2 "
	Cut from Galv. Sheet.....	21"	96"	9	14	32.2 "	2.3 "
	Galv. after Cutting.	21"	96"	9	14	35.8 "	2.56 "



Accidents like this don't happen when the plaster is applied over Metal Lath. The small diamond meshes of Kno-Burn hold the plastic material with a vise-like grip, preventing cracking or falling.

Basements and Cellars

CONSIDERABLE importance attaches to the proper construction of basements or cellars. This for two reasons—the elimination of dampness and the lessening of fire hazard.

Basement or cellar walls—those extending below the surface of the ground or first floor beams to the foundation—are usually of stone, brick or concrete. These walls are constantly absorbing moisture from the soil; and unless proper precautions are taken, the basement will be damp and consequently unhealthy.

It must also be remembered that a large proportion of all fires start in the basement—that as a matter of fact every furnace is a potential fire hazard, and that the tendency of fire is to spread upward. Very frequently a basement fire may thus spread out of sight until the flames burst out from many points simultaneously.

Metal Lath properly applied is an efficacious remedy for both these evils.

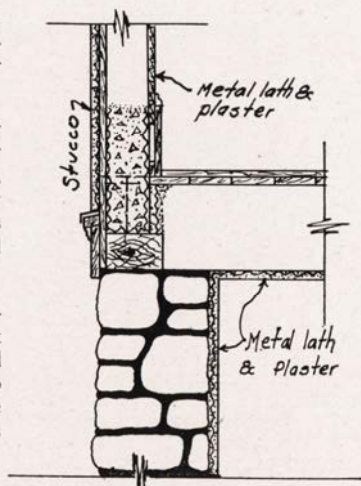


Fig. 4

Foundation Walls.

The thickness of foundations or other bearing walls of masonry are frequently controlled by building ordinances. Otherwise the following is recommended as good practice. Foundation walls of rubble stone should be at least 8 inches thicker than the wall above them. If of brick or concrete and supporting walls of 30 feet in height the foundation wall should be not less than 4 inches thicker than the walls above them. For ordinary dimensions of walls above them foundation walls of rubble stone will be 21 inches thick and of brick or concrete will be 17 inches thick.

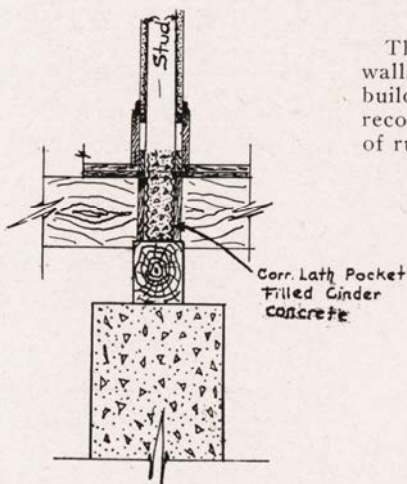
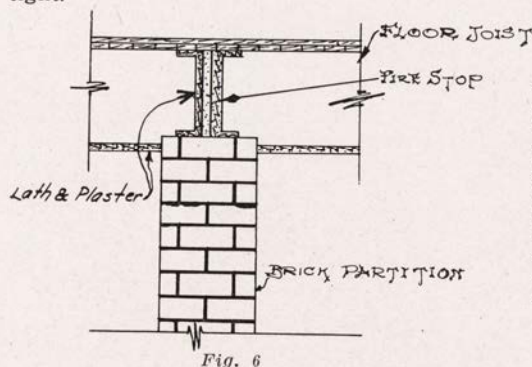


Fig. 5

Twenty-four gauge "Eureka" lath is recommended for this purpose. It is desirable that the basement ceiling should also be lathed with Metal Lath. Such construction gives reasonable assurance not only of a dry, sanitary basement, but permits incipient fires to be localized, thus affording a greater measure of protection to the whole structure.

In checking basement plans particular attention should be taken to see if there is plenty of room for the cellar stairs, since it sometimes happens that no provision has been made for a recess in stone foundations for the stairway—the walls being carried around the same thickness—an omission which will be quickly detected on the rechecking of the plans.

The steps to the cellar should be of concrete—since these—unlike other kinds become stronger with age, and in addition are safe under heavy loads and water tight.



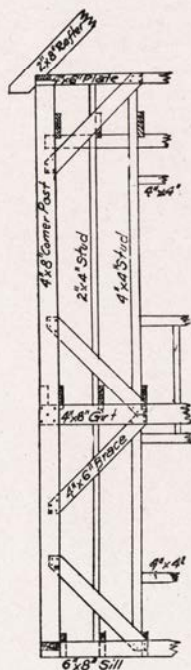
In this sketch (Fig. 6) is shown a method of arranging fire stops between the joists over basements—a treatment especially recommended for boiler rooms, since the wood construction is thoroughly protected. Note particularly the finished ceiling. Ventilators must be placed in walls so that adequate circulation of air may be secured to prevent dry rot.

Framing

IN metal lath construction, except in a few details, the framing is put up in the same manner as is customary in erecting the ordinary wood frame and wood exterior building.

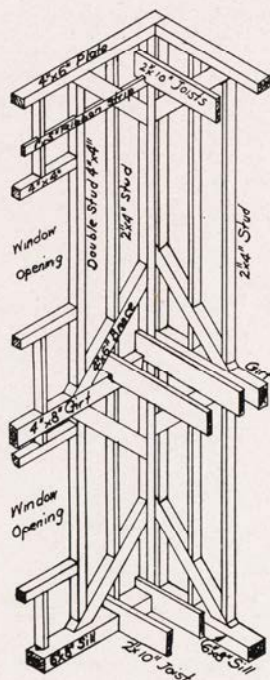
Since the sill may be placed a considerable distance below the first floor it is necessary to carry the first floor joists on a ribbon let into the studding in the same manner as is usually followed for the second floor joists.

The studs are 2"x4" and are continuous from the sill to the roof plate and in the case of Kno-Fur are spaced 12 to 16 inches apart. As an added precautionary measure midway between the floors and between the second floor and the roof plate, a line of 2"x3" bridging should be placed as shown in cut. These boards will also serve as sills for the joists which in addition are securely spiked to the side of the studs.



Wood frame for Metal Lath-Stucco House.

Fig. 7



Two Methods of Construction

In the back plastered type the frame is erected as shown in Fig. 9. The exterior faces of the studs are coated with either waterproof paint or waterproof building paper. Either "Kno-Burn" or "Kno-Fur" are then fastened direct to studding without using any sheathing. If "Kno-Burn" be used the lath must be furred out from the studding with small metal furring strips or pencil rods so that the plaster can flow through. After the lath is in place three coats of stucco are applied to the exterior. Before the lath for the inside is put on a fourth coat of Portland Cement plaster is applied to the inside of the exterior lath filling in between the studding to a depth of $\frac{1}{2}$ to $\frac{3}{4}$ of an inch.

In the sheathed type of stucco wall the usual method of construction is followed up to placing the sheathing. After this has been nailed horizontally to the studding waterproofed building paper is nailed over the sheathing. Self-furring "Kno-Fur" Expanded Metal Lath is then placed over the paper and nailed or stapled to the sheathing.

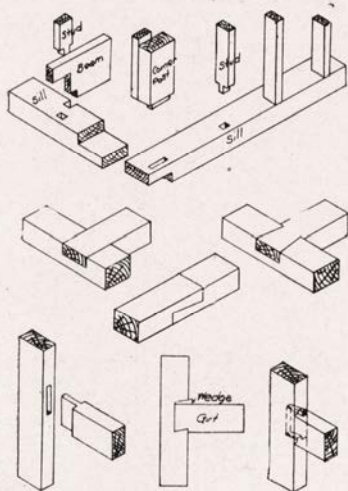


Fig. 8

Enlarged Detail of Framing.
(See Fig. 7) (preceding page 14.)

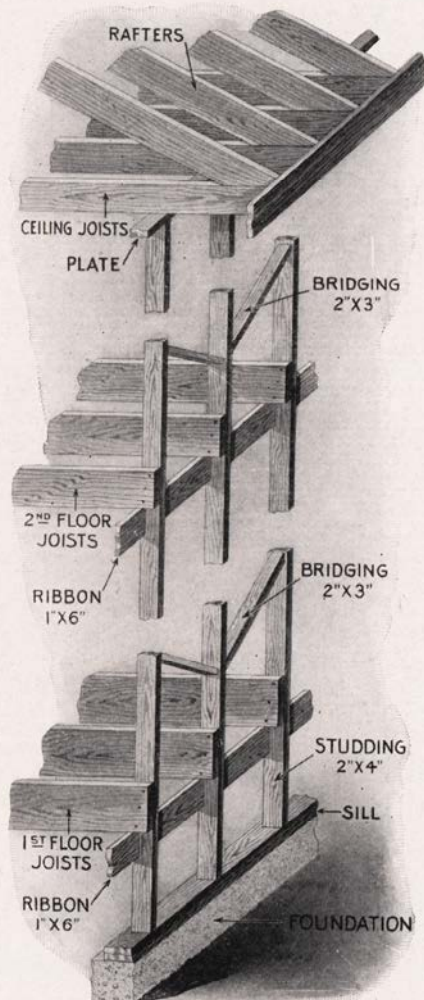


Fig. 9

Construction for Back-Plastered
Stucco Walls.

After the metal lath is in place three coats of the stucco are applied, the first being forced through the lath and against the building paper so as to embed the face of the lath $\frac{1}{2}$ inch or the depth of the furring ribs.

XX Century Expanded Metal Lath

Acid Proof—Not Affected by Severe Climatic Conditions.

XX Century Metal Lath is designed to meet a growing need for a lath that is proof against acid corrosion, and for damp or rigorous climates. It is indicated for use with any plastic preparation which contain acids, and also where the finished work is subject to dampness.

XX Century is manufactured from a special sheet metal of a composition that is proof against acid corrosion. Exhaustive tests in localities where atmospheric conditions are particularly severe on exposed iron and steel have demonstrated that this metal will stand up as well as any iron or steel produced, and has a higher degree of efficiency than many products that show well under an acid test.



Actual size of Mesh of "XX Century" Lath

Similar in Shape and Size to the Famous "Kno-Burn."

The mesh of XX Century in shape and size is identical with that of our well known "Kno-Burn." It therefore possesses all the desirable qualities of the latter and with the additional advantage of being acid-proof and unaffected by damp.

This greatly increases its scope of usefulness, since while plaster, properly applied and of good materials, forms a perfect protection for completely embedded lath yet to provide against contingencies of accident of climatic or chemical conditions, the use of a lath such as we offer in XXth Century is frequently indicated.

Furnished Painted Only.

XXth Century is rigid and therefore exceedingly easy to work. It is always furnished painted with a maroon colored carbon paint of the same quality as that used in "Kno-Burn."

Stock Sizes and Weights of "XX Century" Lath

No.	Width of Sheets	Length of Sheets	Sheets per Bundle	Yards per Bundle	Weight per Bundle	Weight per Yard
24-ga.	18"	96"	9	12	40.8 lbs.	3.4 lbs.
25-ga.	18"	96"	9	12	36.0 "	3.0 "
26-ga.	18"	96"	9	12	30.0 "	2.5 "
27-ga.	18"	96"	9	12	28.0 "	2 1/3 "

*Can be furnished in 24 inches wide, 16 yards per bundle.

Exterior Walls

IN THE Metal Lath house, as in any other type of construction, good materials and sound workmanship are requisite to assure satisfaction.

For stucco work either "Kno-Burn," "Kno-Burn Corrugated" or "Kno-Fur"—preferably 24-gauge—will give the best results, and of the plastic preparations there are a number of prepared fibrous mineral compounds on the market such as Nale Code, for which strong claims are made. In using these, care should be taken to implicitly follow the manufacturer's directions, since faulty application may result in a poor job.

The wood studding for exterior walls shall be spaced 12 to 16 inches, c to c and shall be continuous from foundation to rafters. These studs shall be tied together just below the floor and ceiling joists with 1" x 6" boards let into the studs on the inner side so as to be flush with the inner face and securely nailed to them. These boards shall act as sills for the joists which shall also be securely spiked to the studding.

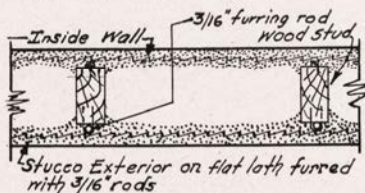
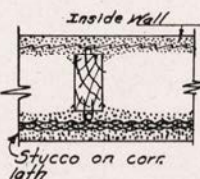
The studding shall be well bridged with one line of bridging between each two floors.

The outside face and one inch of each side back from the face shall be waterproofed with tar or asphalt.

All downspout hangers and all other fixed supports and fasteners shall be put on before the plastering is applied.

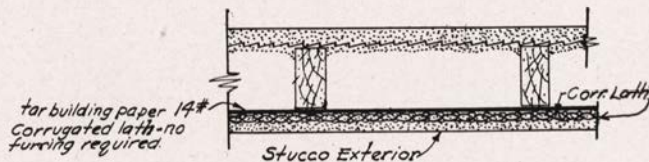
Wall copings, balustrade rails, chimney caps, corners, etc., shall be of fire-proof material and care should be taken to have all trim so placed that it will show its proper projection where lath and plaster are applied—(at least 1½ inches should be allowed for lath and plaster.) It is also essential that all sills be provided with a good drip to prevent any water from getting behind the plaster, care being exercised that the sills are so set that this drip will not be covered by the plaster.

The lath and plaster should stop about 6" above ground, a good drip being provided at this point to prevent water from entering the foundation.



Method of Application.

The lath is fastened with the long dimension of the sheet at right angles to the studding, taking the precaution to see that the dip of the strands are down and away from the workman.



In moist soils the exterior of foundation walls should be plastered with Portland cement mortar with 10% of hydrated lime and the interior with the same mortar on expanded metal lath furred out from the wall.

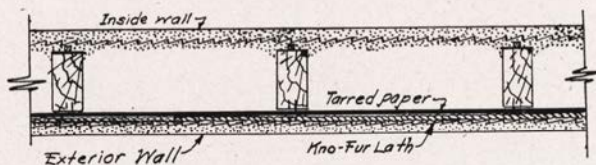


Fig. 10

Care should be taken to have the upper edge of each sheet of lath lap over the lower edge of the sheet next above in order that there may be no projection to catch the upward sweep of a plasterer's trowel.

The lath is secured to the wood studs with staples and furred out $\frac{3}{8}$ " to $\frac{1}{2}$ " from the wood, thus causing it to be entirely embedded in the edge of the cement stucco. If "Kno-Fur" is used, however, no furring will be required. It can be fastened to the studding with either $1\frac{1}{2}$ " staples or large headed roofing nails. The lath is to be applied and plastered before lathing the interior. A coat of back plaster is then given before the interior lathing is applied, the wall thus becoming vertically a homogeneous slab of cement and steel which possess maximum rigidity.

All exposed angles, such as the corners of the house, etc., should be protected by 6-inch pieces of metal lath (or No. 1 A Kno Equal Corner Bead) bent around them, and securely fastened to the metal lath before putting on the plaster, thus preventing the plaster from being defaced or, accidentally cracked or chipped off.

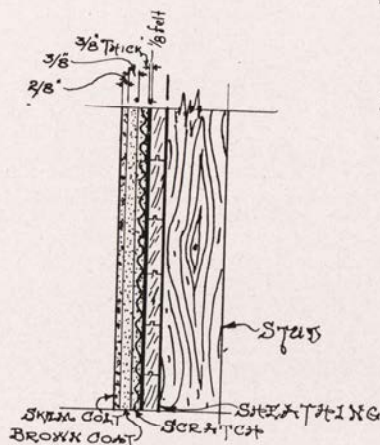


Fig. 11

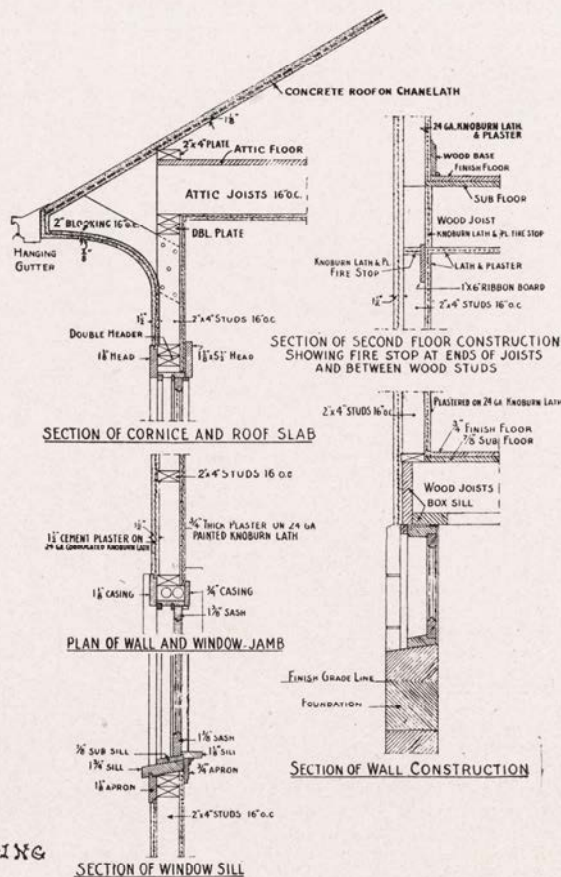


Fig. 12

Fig. 11 illustrates section of exterior wall wherein sheathing boards are used. Tarred paper is laid directly over sheathing boards and a self furring lath such as 24 gauge Corrugated Kno-Burn is stapled to the framing and then plastered in the usual manner—the relative thickness of the various plaster coats being shown in the cut.

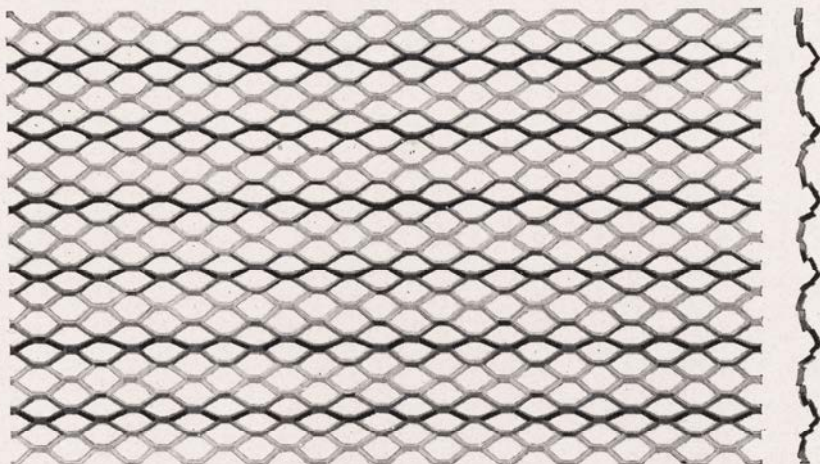
Fig. 12 shows a method of treatment wherein no sheathing boards are used. In their stead a heavy weight waterproofed building paper, well lapped at the joints is applied over the exterior of the studding. Over this is stapled 24 gauge "Kno-Burn" Corrugated, and the stucco then put on in the usual manner.

Corrugated Expanded Metal Lath

A Time and Labor Saver.

Because of the increasing demand for a self furring lath we now furnish either **Kno-Burn**, **Eureka** or **XX Century Corrugated** as well as in the plain meshes.

The corrugations (see below) which act as furring strips are $\frac{1}{4}$ -inch deep and spaced 1-inch apart running lengthwise of the sheets. Since these corrugations are open meshes they will completely embed in the plaster and insure a perfect "key" over the entire plastering surface. And in addition they add materially to the reinforcing value of the lath.



Section of Corrugated Kno-Burn, Eureka or XXth Century.

Not only does "Corrugated" lath retain the specific advantages of whichever type of mesh of which it is formed (either the famous "**Kno-Burn**," the acid proof "**XXth Century**" or the economical "**Eureka**") but it eliminates the need for using furring strips, which if of wood are apt to alternately swell and shrink with atmospheric changes causing cracking, while metal furring strips increase the time and labor required to erect the lath and thereby add to the expense of the work. Furthermore, because of its rigidity **Corrugated Lath** can be covered quicker than the ordinary flat lath, the projections picking up and more readily gripping the plastic covering.

Kno-Burn Corrugated can be furnished in the same sizes and weights as **Kno-Burn flat lath** (see page 7) **Eureka Corrugated** as on page 11, **XXth Century** as on page 16.

Method of constructing fire stops with corrugated lath pocket, filled with cinder concrete.

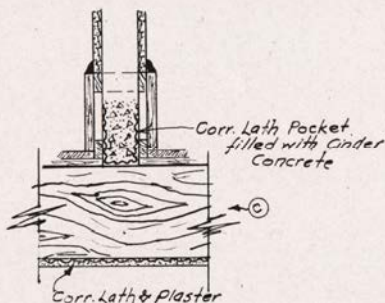


Fig. 13

Interior Walls

AFTER the exterior work has been completed and the back plaster applied to the inside of the lath comes the treatment of the interior walls. For these either "Kno-Burn", "Kno-Burn" Corrugated, "XX Century" or "Kno-Fur" should be used. These materials absorb no moisture from the wet plaster,—expand and contract in the same ratio as the plastic covering, and hence form a permanent, stable supporting base which prevents cracking of the plaster or falling and thus assures a greater degree of permanence to the wall.

For the Plastic covering choice may be made either of cement or lime plaster or one of the many patent preparations to be everywhere had. In the latter case, however, the copper bearing of XX Century lath will give the best satisfaction.

If "Kno-Burn" or "XX Century" plain lath are to be used it will be necessary to fur it out from the face of the studding, using either a 1/4" crimped steel strip or round rod to provide a sufficient space so the plaster can "key" to the lath.

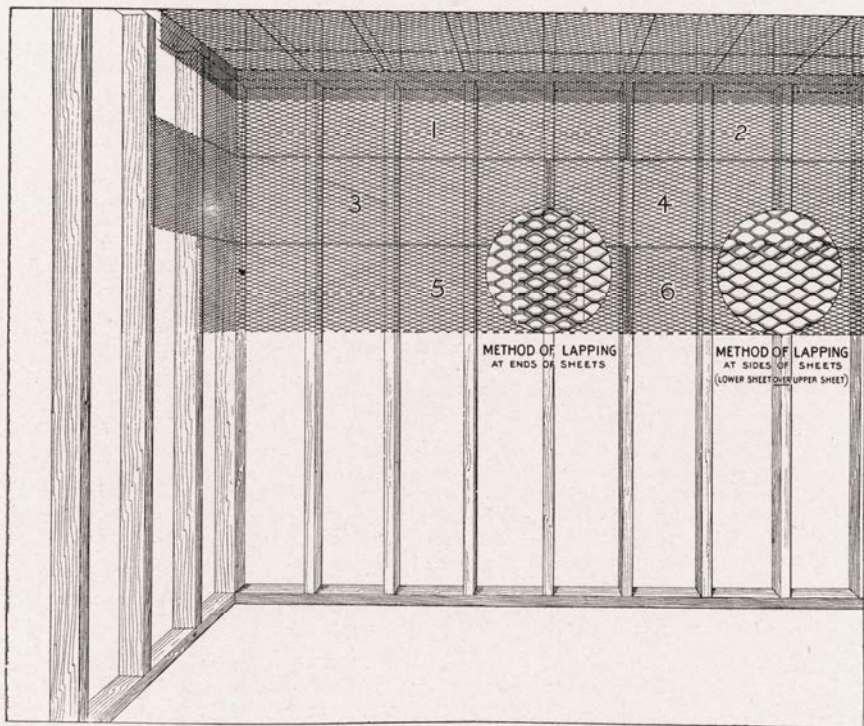


Fig. 14

Method of Applying "Kno-Burn" Lath on Wood Construction

Method of Applying Lath.

The method of applying the lath is shown in the illustration Fig. 14. The sheet numbered "1" is applied first, beginning at the first support beyond the corner. Care should be taken to see that the slant or dip of the strands is away from the side on which the plaster is to be applied. Sheet number "2" is next, the end lapping over the end of number "1" as shown in the circle.

Sheet number "3" is started at the second support beyond the corner, so that the sheets will break joints and be continuous around the corner. Sheets "4", "5" and "6" follow in the order shown in the illustration. Sheet "5" laps over sheet "3", which in turn laps over sheet "1". The remainder of the sheets are placed in the same manner until the whole wall has been lathed. The lath for the ceiling is then applied, allowing it to lap down onto the walls as shown for not less than 6 inches. This lap is wired to the lath on the walls with No. 18-gauge annealed tie wire.



Note method of applying KNO-BURN

Metal lath is fastened to wood supports by means of small wire staples placed not more than $4\frac{1}{2}$ inches apart. Some lathers prefer a small nail, driving it part way into the wood and then bending it over and clinching the lath.

Treatment of Corners.

To prevent cracking at the angles of the room, strips of lath are bent over and securely stapled. If corner bead be used at projections it can be fastened over these strips thus serving as an additional protection against a chance blow that might otherwise seriously deface the plaster.

Partitions

Partitions are generally divided into two classes, namely, load-bearing and non-bearing partitions.

(1) Load-Bearing Partitions.

Are those which carry floor or other structural loads and may be of either brick, tile or concrete and are commonly called walls.

(2) Non-Bearing Partitions.

Partitions used for divisional purposes only. Of the various types used the metal lath and plaster is gaining in popularity. They are usually built as 2-inch solid partitions, or 3-inch and 4-inch both in the hollow and solid type.

From the standpoint of economy, rapidity of erection, strength and durability one of the best types of fireproof partitions is the 2-inch solid metal lath and plaster partition.

This partition is readily adapted to loft buildings, and all other structures where changes are occurring from time to time to meet the ideas of the lessee, or growth of business which necessarily means more office space. These partitions can be demolished with the same amount of rapidity as any of the other types. The resultant saving in floor space by the use of this 2-inch solid partition as compared to other types of 4-inch to 8-inch depth may be readily appreciated, and means more rental space to the owner. Although 2-inch solid partitions are also used for fireproof shafts, the permanent partitions around elevated shafts, stair wells and belt enclosures may be built 4 inches deep with cinder concrete fill, as the insulation qualities of the cinder concrete may be utilized as a fire prevention factor.

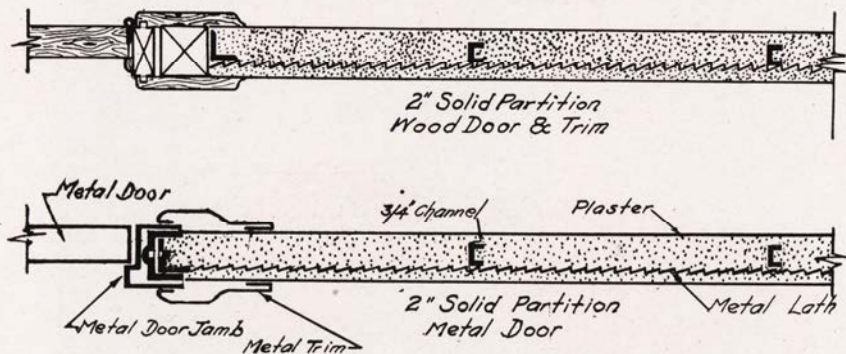


Fig. 15

(3) Two-Inch Solid Partitions.

The weight of the 2-inch solid partition averages from 18 lbs. to 20 lbs. per square foot. This class of partition occupies less space and is lighter than any other practical fireproof partition of equal strength. The sound deadening properties have shown up well. In a test held some years ago in Chicago, the 2-inch solid partition showed up surprisingly well and ranked very high in sound deadening properties.

(4) Method of Construction.

A 2-inch solid partition of KNO-BURN lath and plaster is usually constructed of steel studs. It has become a general method now to use a light 3/4-inch to 1-inch channel on 12 inch to 16 inch centers and this framing in turn

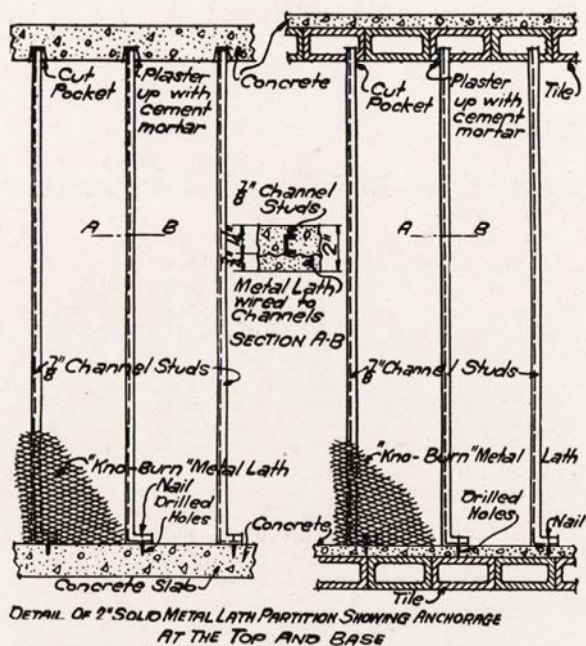


Fig. 16



Fig. 17

The partitions and ceilings of this handsome building were all constructed with "Kno-Burn"

is lined with 24 gauge KNO-BURN lath and plastered on both sides to an overall depth of 2 inches. These channels may be bent at ends, nailed or anchored to floor and ceiling line.

Construction Details—Solid Partitions

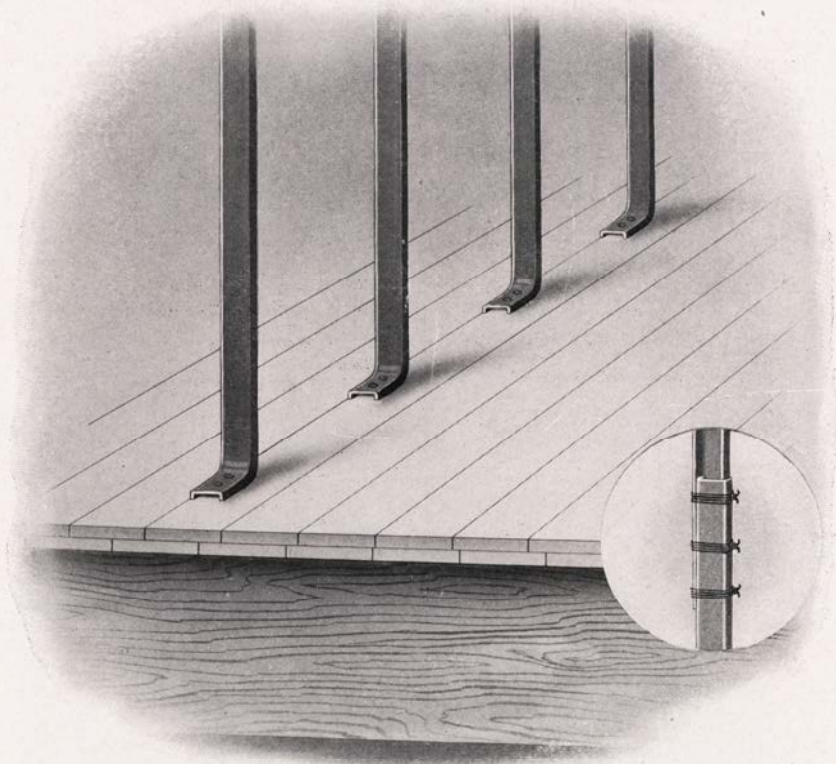


Fig. 18

Method of Erecting Channels on Wood Floor

Note the Small Circular Cut Which Shows the Method of Splicing Channels Near Ceiling

Another method is to leave holes in floor and ceiling line and spring the $\frac{3}{4}$ -inch channels into place, filling the holes with concrete and thereby locking the studs in place. After the lath is placed, the carpenter should attach wooden grounds to secure the base, chair rail, picture molding, etc.

(5) Double Partitions.

This title is given to partitions with metal lath on both sides of studding. This includes the hollow partition type and solid (filled) type of 3 inch and 4 inch depth. They are constructed with $\frac{3}{4}$ -inch or 1 inch channels (angles may be used) separated to proper offset and secured in place by bending both ends of channels and nailing same to floor or ceiling line. (In concrete or tile floor construction, holes may be made so that channels can be sprung into place

Construction Details—Solid Partitions

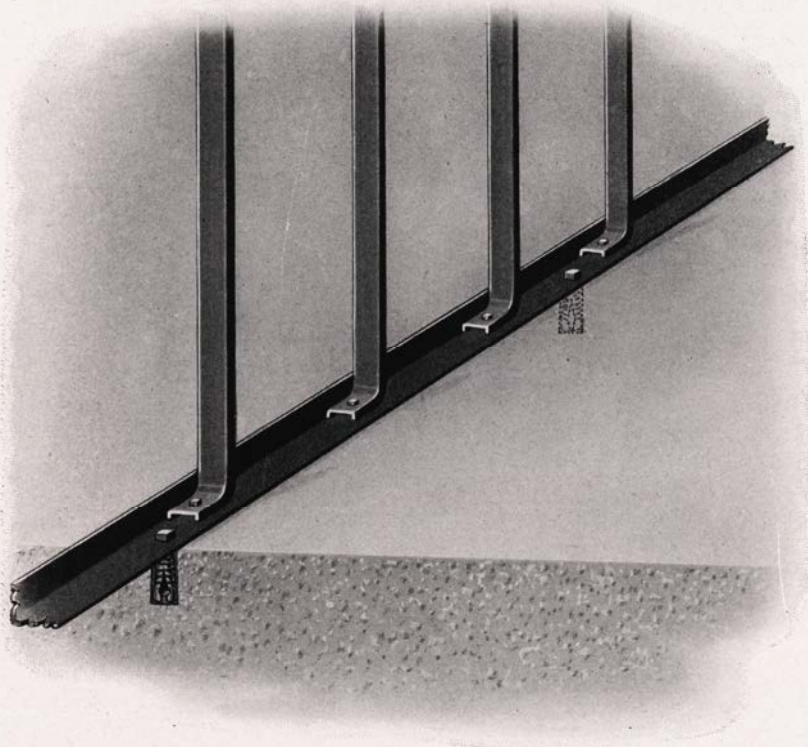


Fig. 19

Method of Erecting Channels on Concrete Floor

and these slots filled in with concrete, giving proper anchorage.) The studs are spaced from 12 inches to 16 inches depending upon the weight and gauge of lath to be used. The height should be considered also when spacing studs; 16 inches is alright for heights up to 10 feet. For greater heights use the 12 inch spacing. This gives two lines of studs, the studs being opposite.

Another form of frame bracing is to anchor rods (of sufficient strength) in the floor and ceiling line on 6 inch to 8 inch centers to project from the ceiling

and floor line. To these bars, tie with No. 16 gauge galvanized wire, a runner bar or 1½-inch channel at right angles 6 inches from ceiling or floor line. The ¾-inch channel studs may then be tied to these runners.

(6) Solid Three-Inch or Four-Inch Partitions.

These partitions are built as per above specifications and the space between the two layers of metal lath is filled with cinder concrete. This type has considerable strength and will withstand fire and water successfully for a longer period than any other type of partition. At the same time, this partition affords space for, and gives necessary protection, for pipes. This class of partition makes an ideal nailing base.

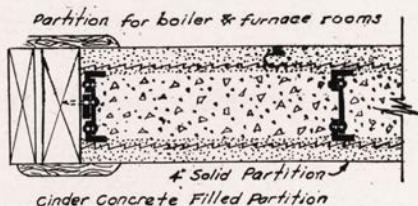


Fig. 20

(7) Solid Partition (Filled with cinder concrete) Three or Four Inches Thick.

All openings of this type of partition are framed with 2 inch by 2 inch x ⅛-inch angles or by channels of the same size as the studs, punched to provide anchorage to studs. Upright angles at sides of doorways extend the full height of the partition.

(8) Method of Construction.

24 gauge Kno-Burn Lath is erected on both sides of the studs, spaced 12 inches to 16 inches, on centers, and thoroughly tied with 18 gauge galvanized wire and the space between the two layers of lath is then filled with cinder concrete. Two or three coats of plaster may then be applied to the outer surface of the lath finishing to a total thickness of 4 inches. (The weight of this partition varies from 26½ pounds to 30 pounds per square foot, depending upon the framing.)

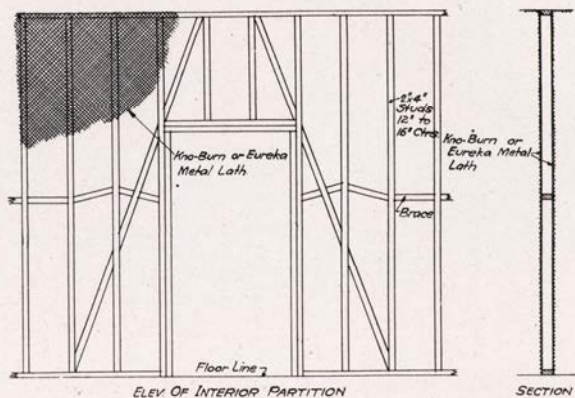


Fig. 21

Maximum Heights Recommended for Metal Lath and Plaster Partitions

4-inch hollow.....	26 feet	3-inch hollow.....	22 feet
4-inch solid (filled).....	30 feet	3-inch solid (filled).....	24 feet
2-inch solid.....	20 feet		

Construction Details—Solid Partitions

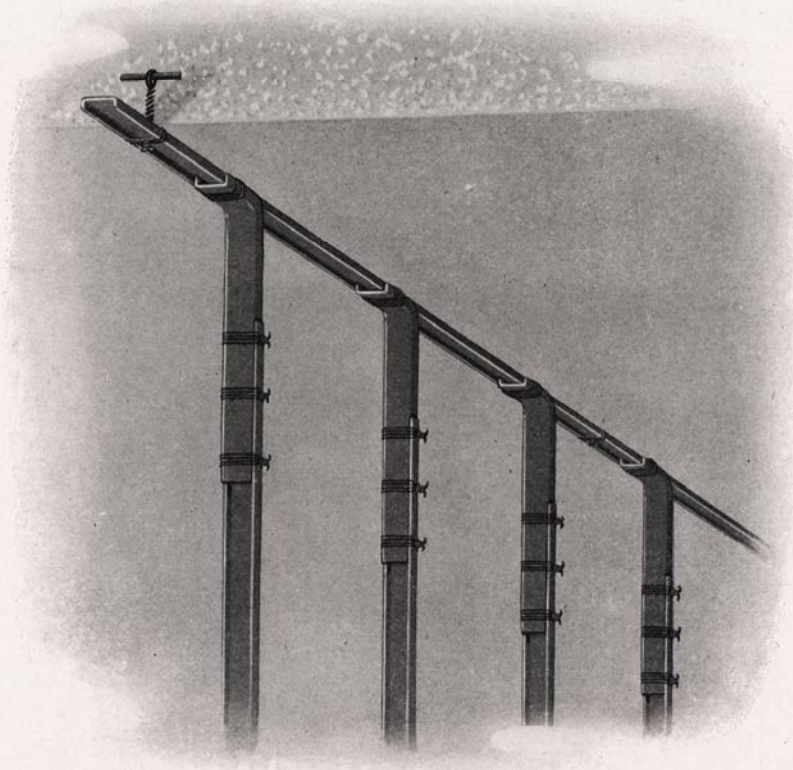


Fig. 22

Method of Fastening Channel to Concrete Ceiling

The wire support for the channel is placed before the concrete is poured. A small block is placed back of the channel used as a runner so as to provide room for wiring the shoe to the runner. No. 18-gauge tie wire is used for all of this class of work.

U. S. Experts Endorse Metal Lath as a Base for Stucco

"This type of stucco construction on metal lath and back plastered with omission of sheathing boards has a decided appeal as a logical type for wood frame construction."

BUREAU OF STANDARDS

Construction Details—Solid Partitions

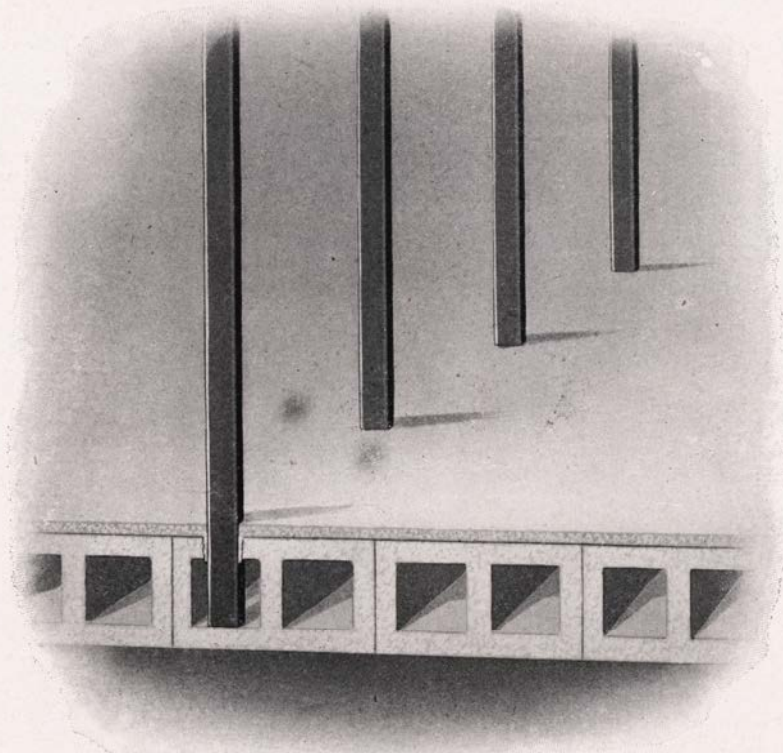


Fig. 25

Method of Fastening Channels to Tile Floor

The above illustration shows how the studding for a solid partition is erected when the floor construction is of hollow tile. The holes are, of course, made after the tile has been placed and are cut oblong, with the long dimension parallel to the partition, so that when the channels are inserted and turned around to the proper position they fit snugly.

"Danger Points" in Frame Construction Where the Use of Metal Lath is Especially Indicated

1st. Bearing partitions of wood studs. Because these, if made sufficiently fire resistant, will carry their load until ample time has been afforded the fire department to get in its effective work.

2nd. Inside of exterior walls of frame construction and also all partition spaces and outer wall spaces containing runs of piping from hot air furnaces, etc.

3rd. Basement ceilings especially over heating plants.

4th. Under and around stairs since these obviously need protection as a

means of egress for occupants of floors above.

5th. Closets because fires often originate therein and because their contents are frequently inflammable.

6th. At chimney breasts and around flues.

As a base for exterior stucco the Underwriters' Tests show that 3 coat stucco on metal lath successfully resisted far more than an hour extreme heat—of a greater temperature than the exterior of any building would be subjected to in a neighborhood fire.

(9) Saving of Weight an Important Factor.

A 4 inch solid (filled) partition is especially desirable for loft buildings, factories, etc., because of their fire and sound-proofness as well as lightness with comparison with other types of solid partition. The weight is a big item, because these partitions are used merely as sub-dividers of space or area or to enclose stairs, shafts, etc., known as non-bearing partitions, and become a part of the dead load. This added weight to the floors necessarily means heavier framing, which naturally increases the cost of the structure.

Solid metal lath and plaster partitions, filled with cinder concrete also reduce the floor load and thus bring about the saving of considerable money by the use of lighter framing, and at the same time give a fire-resisting partition of higher rating, particularly important for buildings wherein are stored combustible materials.

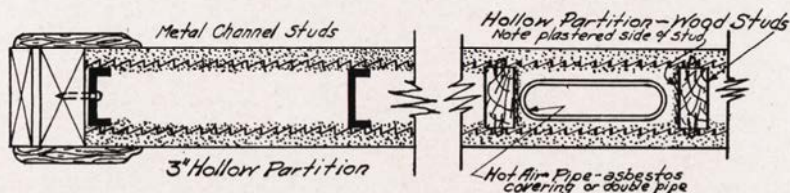


Fig. 23

The same construction as is shown here for the 3-inch Hollow Partition may also be used for 4-inch Hollow Partitions

(10) Three or Four-Inch Hollow Partitions.

In the construction of the above perhaps, the better method of erecting the framing is by use of light channels or angles riveted together with strips of light band iron, on 40 to 48 inch centers (similar frame recommended for 3 inch on 4 inch solid partitions.) This makes a very light and economical framing easily erected.

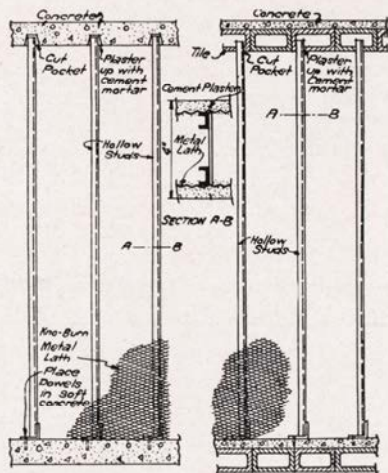


Fig. 24

Detail of 4-inch Hollow Partition Showing Anchorage at Top and Base.

DETAIL OF 4" HOLLOW METAL LATH PARTITION SHOWING ANCHORAGE AT TOP AND BASE

To this framing 24 gauge Kno-Burn Lath is applied on both sides and plastered. The plastering consists of two or preferably three coat work.

Construction Details—Hollow Partitions

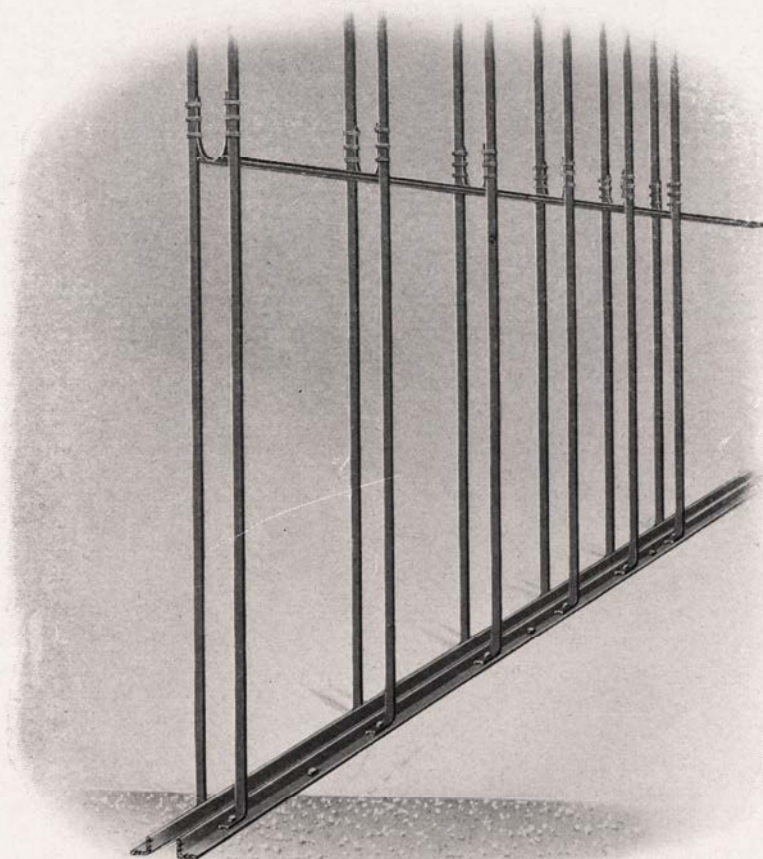


Fig. 26
Method of Erecting Channels for Hollow Partition.

This type of partition is fastened to the floor and ceiling the same as the solid partition.

Weights of Materials	Pounds per sq. ft.
$\frac{7}{8}$ -inch Georgia pine or maple flooring.....	4
$\frac{7}{8}$ -inch Spruce under flooring.....	2
Cement, tile or marble floors, 1 inch thick.....	10
Cinder concrete, per inch of thickness.....	$9\frac{1}{3}$
Two coats of plaster in Soffit or floor arches.....	6
Suspended ceilings with 3 coats of plaster.....	10

Suspended Ceilings

A valuable lesson taught by recent big fires is that a suspended ceiling of lath and plaster affords splendid protection to concrete floors and beams. For while the ceiling itself may be damaged or even destroyed it nevertheless has afforded efficient protection to the vital floor construction above. In many buildings therefore the fireproof suspended and curved ceiling is now a necessity and practice has demonstrated that the simplest and most economical method of erecting is with Kno-Burn Metal Lath applied to a supporting frame of light steel framing. Any type of ceiling may be thus constructed without regard to the form or the roof or floor above. From a fire-protection standpoint, however, a flush ceiling without any projections is most desirable.

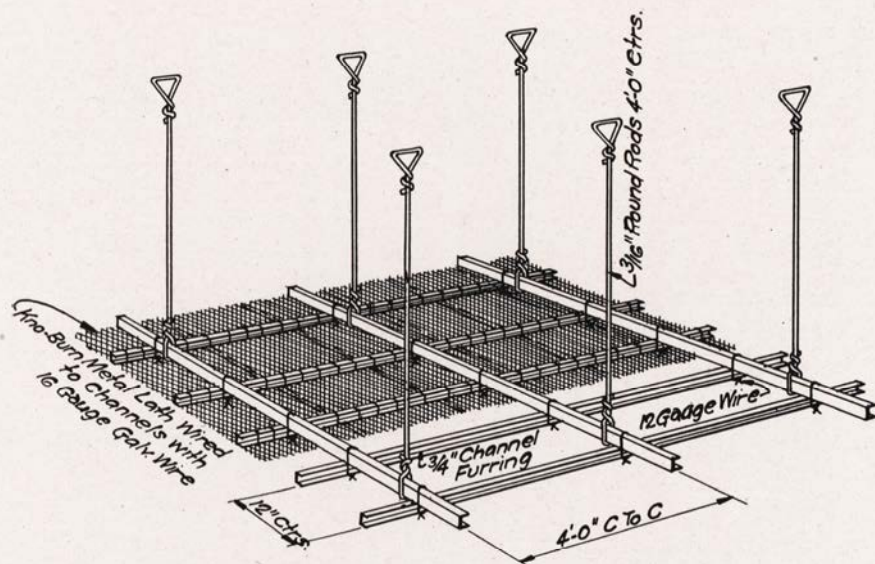


Fig. 27

Method of Framing For Suspended Ceiling

A level ceiling of this type will reflect and distribute the light from the windows to the best advantage. The space forms a plenum chamber which can be utilized for heating and ventilating purposes. Practically all modern theatres have this plenum chamber beneath the seats using it for air cooling system, ventilating purposes in the summer, and for heating purposes in the winter. The suspended ceiling above an auditorium serves for ventilating. It also avoids plastering directly on the concrete thus preventing sweating and giving a greater permanency to the decorations.

Furthermore the suspended ceiling adds much to the artistic appearance of the room.

Construction.

For ordinary conditions supports for suspended ceilings should be designed to carry a load of 10 to 12 lbs. per square foot, while if the workmen are to have access the ceiling should be designed to carry a load of about 35 to 40 lbs. per square foot.

The method shown in Fig. 28 is used if the roof or floor beams are not more than 5 feet apart. The small $\frac{3}{4}$ -inch channels supporting the metal lath may be clipped or wired to the runner bars instead of passing through as shown. When the ceiling is to be suspended from a concrete roof or floor the hangers are often made of rods or heavy wire. These hangers are placed before pouring the concrete.

Construction Details—Suspended Ceilings

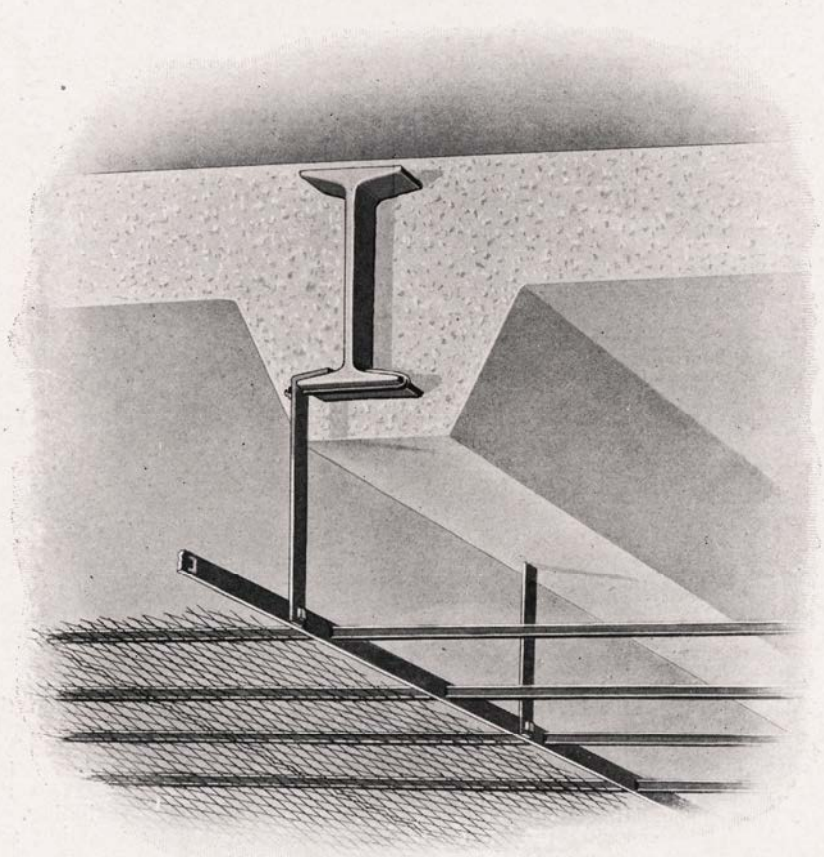


Fig. 28

Method of Erecting Ceiling Suspended from Beams

(If beams are farther apart than 5 feet auxiliary supports must be used between, spaced 4 feet in opposite direction.)

Specifications

Suspended ceilings shall be constructed of "Kno-Burn" Expanded Metal Lath applied to a supporting frame of light steel members constructed as follows: The steel frame consists of runners of $1\frac{1}{2}$ " steel channels, $1\frac{1}{2}$ "x $\frac{3}{16}$ " or 2 "x $\frac{1}{4}$ " flat iron, turned on edge, or 2 "x 2 " tees or $1\frac{1}{2}$ "x $1\frac{1}{2}$ " angles spaced 4 feet center to center, hung or suspended by hangers (tied with 16 ga. galvanized tie wire) which may consist of either flats, heavy wire or $3/16$ " or $1/4$ " round steel rods. The $1/4$ " hangers are spaced 4 feet on centers and securely attached to the structural frame or anchored into the concrete or tile roof and floor in such a manner as approved by the architect. If the $3/16$ " hangers are used they should be spaced closer than 4 feet on centers.

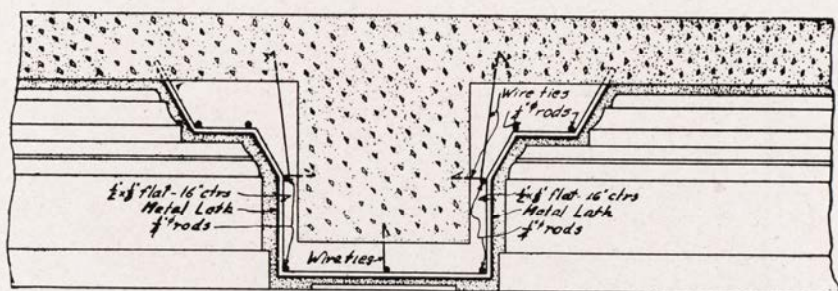


Fig. 29

Details of Metal Lath Construction

An ornamental plaster beam and cornice placed over a concrete beam. The wire ties supporting the frame are placed before pouring the concrete. The holes to receive the ends of the brackets are drilled after the forms are removed.

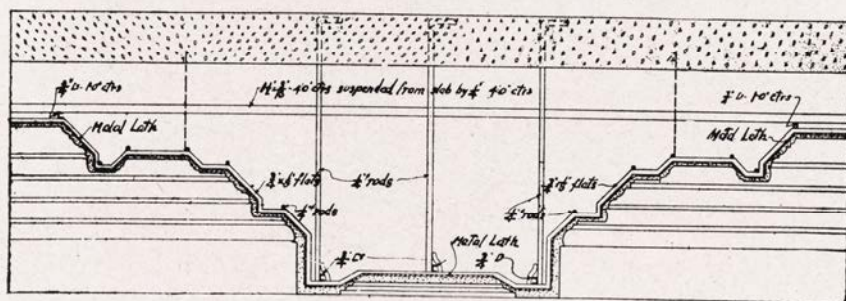


Fig. 30

Details of Construction.

A false beam and suspended ceiling placed below a reinforced concrete floor. The wire and $1/4$ " rod hangers are placed before the concrete is poured. The frame for the suspended ceiling is supported by $1/4$ " rod hangers. The forming of the brackets is done on the job.

Construction Details—Suspended Ceilings

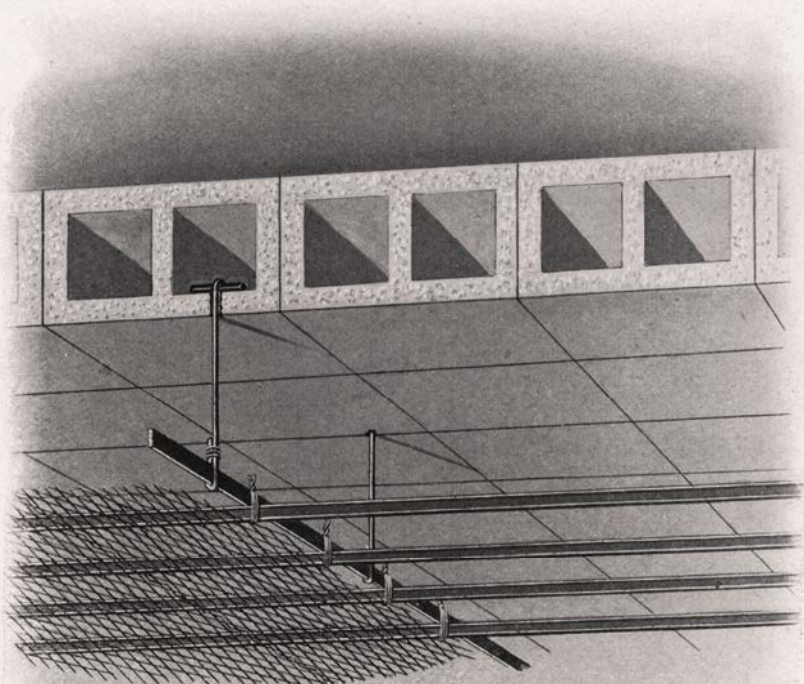


Fig. 31

Method of Suspending Ceiling Below Tile, Showing Manner of Applying Hanger. A Wire Hanger Is Often Used Instead of the Rod As Shown

The runners are to be securely tied or bolted to the hangers or otherwise firmly fastened. These hangers shall be of such length as to provide the desired height to the finished ceiling. Wire or securely clip them in place at right angles to the channels (or other form of runners) $\frac{3}{4}$ " (rolled or formed steel channels) 12" on centers. Wire every 6 inches (with 18 ga. galvanized tie wires) to these

$\frac{3}{4}$ " channels, 24 ga. "Kno-Burn" Painted Metal Lath—minimum weight 3.4 lbs. per square yard. All laps are to be securely tied with 16 ga. galvanized tie wire.

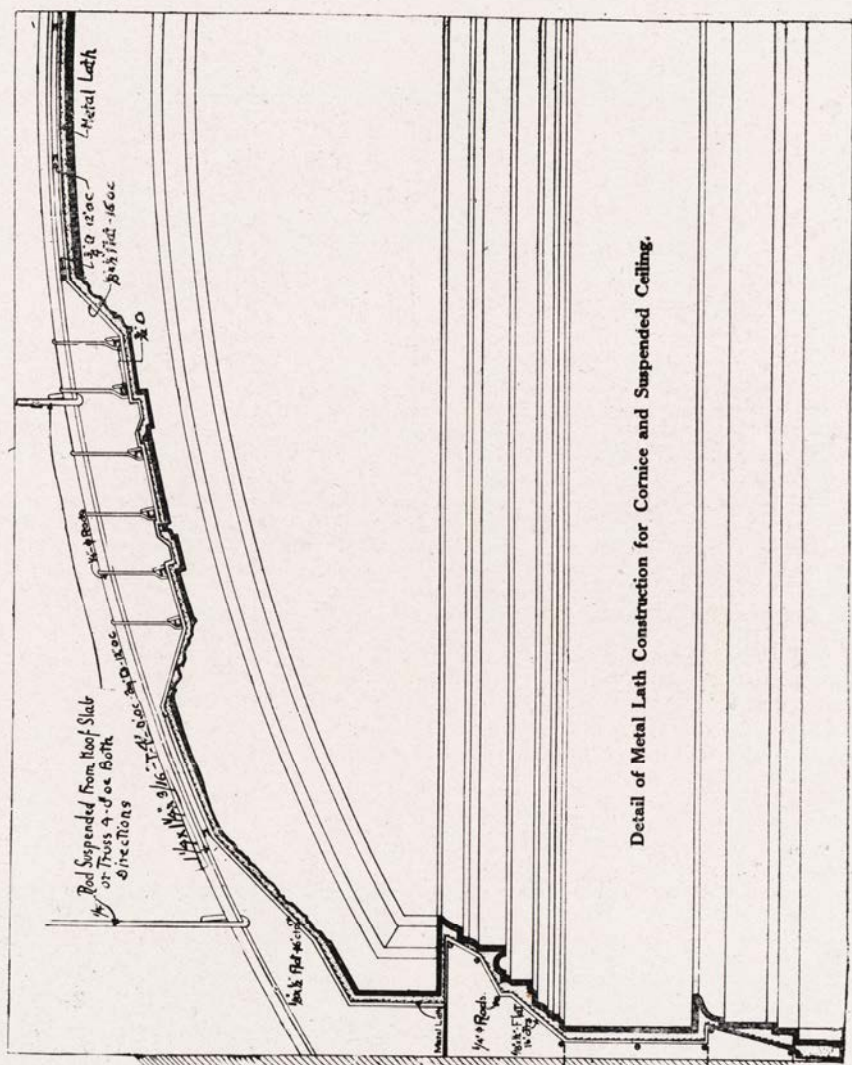


Fig. 32

See page 36.

The plaster is applied to the lath in the usual way, but care should be taken to see that the first coat contains a sufficient proportion of hair or fibre to assure the necessary cohesion and tenacity.

Making and Installing Hangers for Suspended Ceiling and Ornamental Work

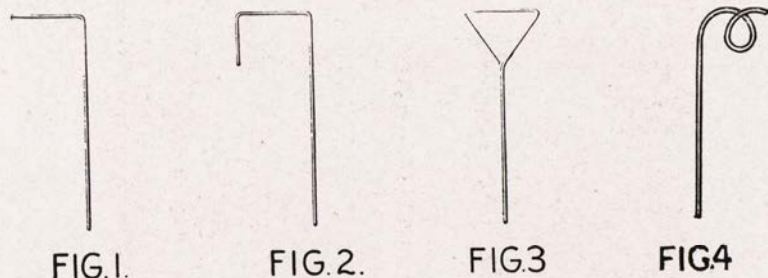


Fig. 33

Since improper or careless methods in making and installing hangers for the support of suspended ceiling and ornamental plastering work may result in costly and even dangerous accidents, this is a detail no architect or engineer can afford to overlook.

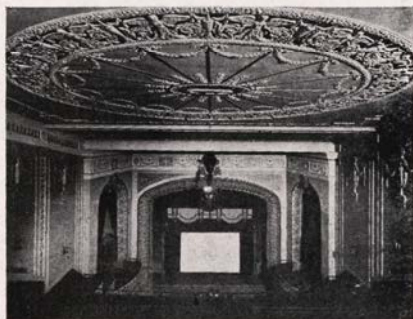
The type of hanger shown in Fig. 1 is undesirable since these are installed after the reinforcing steel is in place and held in position by merely placing the short bend over the bars or rods. In consequence they are frequently kicked aside, falling between the reinforcing steel so that the bent end lays direct on the concrete forms. Frequently the hangers are left thus when the concrete is poured with the result that they pull out during the work and are consequently of no value.

The hanger pictured in Fig. 2 while an improvement, is yet not to be recommended since it is liable to be stepped on by the concrete workman and so flattened out as to become practically as dangerous as No. 1.

On the other hand the "Hessing" type of hanger (Fig. 3) eliminates these dangers and in addition is easily made and installed. The triangle should be made not less than 2" high, and 3" if the slab thickness permits. These hangers can be installed immediately after the centering is in place and cannot be displaced since if stepped on it will swing right back into place.

Holes for hangers should be bored at least $\frac{1}{8}$ " larger than the size of the hanger. This permits the centering to be removed without delay and without bending the hangers.

In Fig. 4 is pictured another type of hanger which gives very satisfactory results. It is very quickly made and will not flatten out if stepped on.

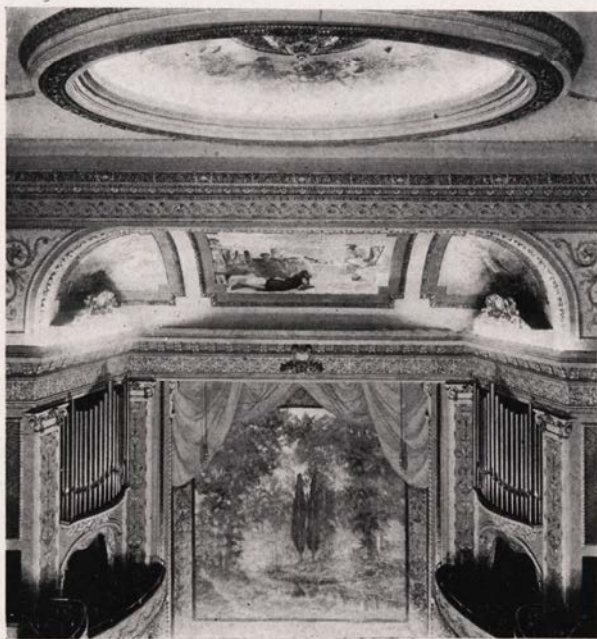


Auditorium of Codman Square Theatre, Boston.
Architect, Jos. McGinnis, Boston. Plastering
Contractor, Crowley & McFarlane, Boston.
"Eureka" Lath Used.

Ornamental Plastering

The Modern Method of Ornamental Plastering.

For interior work in banks, theatres, hotel lobbies, etc., where much decorative plastering is required, the use of **Kno-Burn** metal lath saves time and expense, permitting a greater part of the work to be cast in place.



"Kno-Burn" was used in the construction of the suspended ceiling and all the decorative plastering of this Philadelphia Theatre.

Construction Data.

All ornamental work to be modeled by artistic modelers who will be approved by the architects:—Models to be submitted for approval and no casts to be made until such models have been approved; all patterns to be gotten out by skilled mechanics with true and accurate lines.

Specifications.

The brackets of the cornice are made of $\frac{1}{8} \times \frac{1}{2}$ -inch iron or $\frac{3}{4}$ -inch channels shaped as shown and securely fastened to the wall. These are braced laterally by $\frac{1}{4}$ -inch rods and channels placed at the angles of the brackets. **Kno-Burn** is wired to the brackets and rods with number 16-gauge galvanized wire and the plaster applied to the metal lath in the usual manner. **Kno-Burn** bonds perfectly with the plaster, preventing cracking and pulling off and reduces waste of materials. By the use of a stiff lath of heavy gauge and $\frac{3}{4}$ -inch rolled channels, a rigid frame can be obtained without use of cross furring.

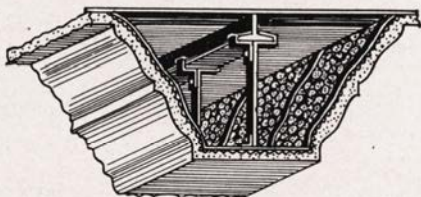


Fig. 34
Method of Furring for Panel Ceiling

Construction Data—Cornice Work.

All moulded beams and cornices will be screeded and run in place with moulds, with true lines and accurate mitres.

Casts.

All casts to be well made, the contractor to supply a sufficient number to meet the requirements of the job, all casts to be made in line, clear and sharp, undercut and free from warps and other irregularities, supplying all necessary shrinkers and stretchers.

Construction Details—Ornamental Plastering

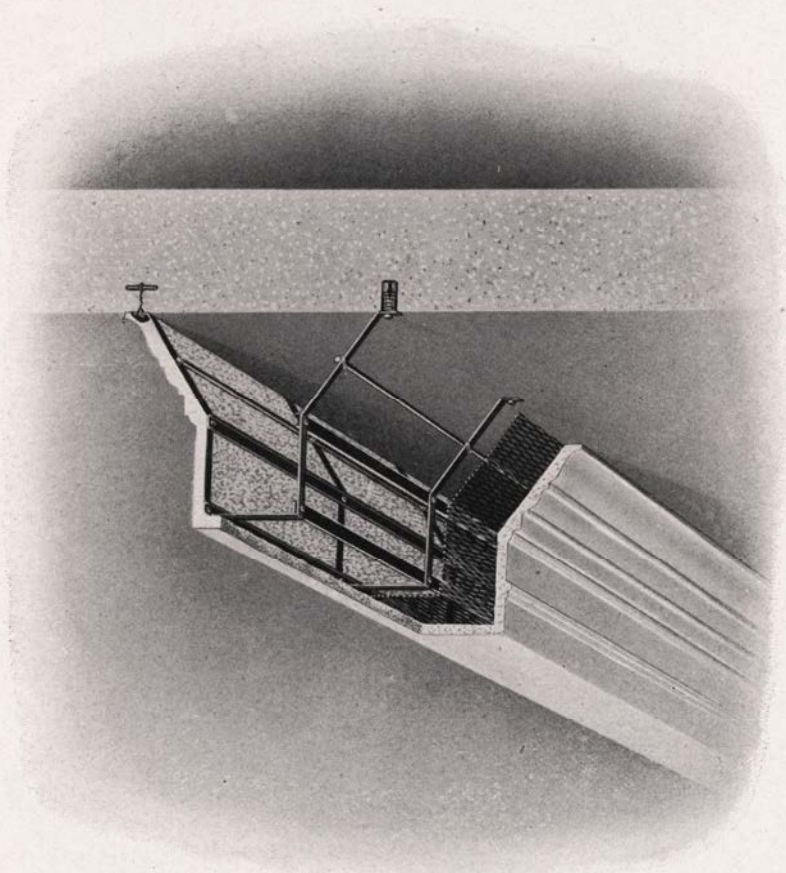


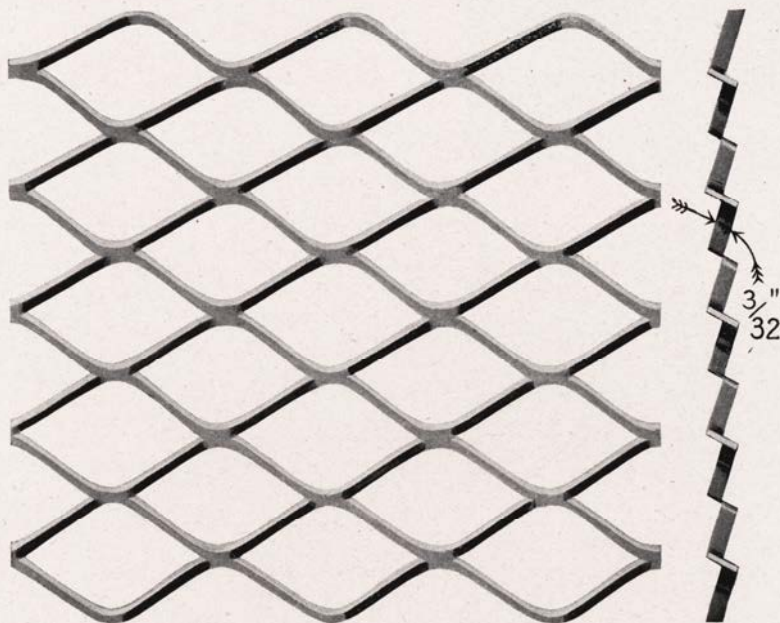
Fig. 35

Method of Erecting Support for Ornamental Beams

False beams, cornices and other ornamental work are often applied to all types of construction. The illustration shows how the frame for this work is constructed. This work is fastened to the ceiling by the same methods as suspended ceilings.

Special Mesh, 22-Gauge, 3-32-Inch Strand Metal Lath

Certain specifications require the use of an extremely heavy metal lath. In order to meet such specifications, the material described and illustrated here was designed. The mesh is about twice as large as the mesh of "Kno-Burn" and the strands are one and one-half times as wide.



Actual Size of Mesh of Special 22-Gauge Lath

Stock Sizes and Weights.

Finish	Width of Sheets	Length of Sheets	Sheets per Bundle	Yards per Bundle	Weight per Bundle	Weight per Sq. Yd.
Painted.....	18"	96"	9	12	51.6 lbs	4.3 lbs.
Cut from Galv. Sheet.....	18"	96"	9	12	56.4 "	4.7 "
Galv. after Cutting.....	18"	96"	9	12	60.6 "	5.05 "

Painted either with asphaltum or carbon paint.

Table of Sizes of Grounds Recommended for Various Classes of Work.

Grounds for 3 coat metal lath work should be $\frac{5}{8}$ inches thick.
 Grounds for 3 coat metal lath work on $\frac{1}{2}$ " non furring should be $1\frac{1}{8}$ " thick.
 Grounds for 3 coat metal lath work on $1\frac{1}{2}$ " non furring should be $1\frac{5}{8}$ " thick.
 Grounds for hard mortar metal lath work on $\frac{1}{2}$ " non furring, $1\frac{1}{8}$ " thick.
 Grounds for hard mortal metal lath work should be $\frac{5}{8}$ " thick.

Possibilities of Stucco



Stucco Finishes

AN increasing number of the show "homes" of America are being built of stucco on metal lath, because of the ease with which this construction may be adapted to any climatic need, to harmonize with any surrounding, for its wonderful color possibilities and architectural flexibility.

Yet it is even more frequently specified for the modest residence, too, because of its permanency, low first and maintenance cost and fire resistant qualities.

150-Year-Old Stucco Houses Splendidly Preserved.

The lasting qualities of stucco is demonstrated by the excellent state of preservation in which are many of the fine old Colonial stucco mansions in and around Northern New Jersey, in Virginia, etc., many of which date well back of the Revolutionary War. In some of these cases the stucco was used as a protective coating for the soft and porous stone, in a number of instances the stucco being applied only on the north walls which bore the brunt of the storm.

Europe also has countless examples of beautiful old stucco residences to offer and returning to our own country we find on the Pacific Coast some wonderfully charming stucco homes which have been built many decades.

Offers Unlimited Scope for Individuality.

Almost any architectural type or period can be reproduced in stucco. It, of all building materials affords the widest latitude to the builder, at the same time offering a freshness and clean cut design not found in other materials. The stucco home is the distinctive home—harmonizing with nature's color tones—and aging slowly and gracefully under the mellowing effects of time.

Initial Cost Moderate—Up-Keep Minimized.

The first cost of the stucco building is lower than that of any other form of construction possessing equal beauty, permanence and fire retardant qualities.

Stucco requires no painting, whereas as a protective measure the wooden building must be re-painted every two or three years. Few repairs are necessary. The Metal Lath—stucco home is literally sheathed in steel and cement—heat has little effect on such construction. Furthermore, this type of building is warm in winter and cool in summer—the ideal all-the-year round home.

Its Wonderful Color Possibilities.

Stucco should never be used to imitate other material. Rather its own latent beauties should be brought out by careful attention to texture, color tones, the judicious use of colored aggregates, finish, etc.

The flat-tone cement coating applied to the finished stucco gives a uniformity of tone that is generally deemed too monotonous.

Dry color pigments furnish the desired note of variety, but first quality materials, precise measurement and accurate mixing are essential to secure satisfactory results,—mineral colors being given the preference.



Attractive Stucco-Metal Lath Residences

Use of Local Aggregates.

Most attractive of all are the effects obtained by the use of exposed natural colored aggregate, such as marble or granite chips or screenings, colored sandstone, gravel, etc.

As a building material, colored aggregate stucco affords almost unlimited possibilities. In warmth, character, variety of tone and texture it possesses undeniable beauty, adaptability to any form of architectural design, and exceeding durability. Furthermore, colored aggregate stucco is fool proof—for since the aggregates constitute the greater bulk of the mortar, any slight inaccuracy in measurement will not detract from the general appearance. And in many localities there are local deposits which may be utilized, thus cutting down freight charges.

Methods of Finishing

In the "integral" method the color aggregates are mixed with the sand and cement and applied as the finish coat of stucco. After the stucco has set about two hours it is scrubbed with a brush and clean water, or mopped with a sponge, (taking care not to disturb the aggregates). This removes the cement film and exposes the full color value of the aggregate.

If a muriatic acid solution is used (one part acid to five parts clean water) care must be used not to wash away too much of the cement, and to immediately spray the stucco with water to remove all traces of the acid.

In the "cast on" method the color aggregates are thrown on the finish coat of white stucco while it is still fresh and lightly pressed in with the float.

Smooth Troweled. Finish coat is lightly smoothed with a metal trowel. (Not recommended.)

Stippled. After the finish coat has been lightly smoothed with a metal trowel, it is lightly and even "stippled" with a broom straw brush.

Sand Floated. The finish coat is first smoothed, then rubbed with a wood float, using a circular motion and a little sand to roughen the surface slightly. This must be done within thirty minutes after the application, otherwise the initial "set" will be disturbed.

Sand Sprayed. The smooth surface is sprayed with a wide, long fibre brush or whisk broom—dipped into a creamy mixture of equal parts of cement and sand mixed fresh every half hour, and kept constantly stirred. This coating is thrown forcibly on the moist surface before it has obtained its final set.

Spatter Dash or Rough Cast. The finish coat is scratched, then a mixture of one part cement and two of sand is thrown forcibly on it to produce a rough surface of uniform texture (care is necessary to prevent this finish from drying out too rapidly).

Pebble Dash. Clean round pebbles, $\frac{1}{4}$ to $\frac{3}{4}$ inch in size, are thrown forcibly against the surface before the finish coat has attained its final "set."

Exposed Aggregates. Marble or granite screenings, coarse sand or any other special aggregates desired are used for the finish coat in proper proportions. They can be treated either by washing—as described under "Integral Method" or "Cast On"—in the same manner as employed in the "Pebble Dash" treatment.

Specifications for Stucco Work

Protection.

All material shall be properly protected while stored at the site and shall not be placed on the ground. Fresh stucco shall be protected against the weather.

Cement.

Aggregate.

Aggregates for undercoats shall be thoroughly clean sand, graded from fine to coarse grains, with the coarse predominating and shall be free from loam, salt, vegetable and other deleterious matter. Aggregate for finish coat shall be thoroughly clean, yellow gravel grit.

Lime.

Lime shall be hydrated lime (state brand.)

Water.

Water shall be clean and free from acids or strong alkalis.

Furring.

If flat lath is used, $\frac{3}{8}$ " round furring rods or crimped steel furring should be applied vertically over face of the studs, using $1\frac{1}{2}$ " 12-gauge staples spaced 8" apart. Self-furring KNO-FUR or Corrugated KNO-BURN Lath (eliminating furring) is preferable.

Lath.

Lath shall be 24 gauge KNO-BURN or KNO-FUR expanded metal lath weighing not less than 3.4 lb. per sq. yd. painted.

NORTH WESTERN EXPANDED METAL CO. CHICAGO. ILL.



A Typical Group of "Kno-Burn" Public Buildings

The great popularity of stucco construction in the hands of the most alert builders results in frequent new developments. The North Western Expanded Metal Company embodies the latest and most approved practice in a supplementary specification, frequently revised, a copy of which will be supplied on request.

Place lath horizontally over the furring, driving $1\frac{1}{2}$ " 12 gauge staples, 8" apart. The staples shall be such that they will go through the lath and astride furring strips and into the wooden stud, and should be driven home without bending. The sheets of lath shall be locked or lapped at least 2 inches on ends and $\frac{3}{4}$ inch on the sides of each sheet and tied at joints between the studs with 18 gauge tie wire. The laps shall be folded around the corners at least three inches.

Mortar.

All coats should contain not less than 3 cu. ft. of fine aggregate to one sack of Portland Cement. If Hydrated lime is used, it should not be in excess of $\frac{1}{5}$ the volume of cement.

(Above approved by Committee on Treatment of Concrete Surfaces of the American Concrete Institute.)

Mixing.

Mixing shall be done on a watertight platform, the different constituents thoroughly mixed dry to a uniform color, water then added to obtain the proper consistency and the whole turned over until the mass is uniform in color and consistency.

There shall not be mixed at one time more mortar than will be used within thirty (30) minutes. No retempered mortar shall be used under any circumstances. (Cement is likely to have its initial set within thirty minutes.)

Dry color if used in the finishing coat shall be very carefully weighed or measured and thoroughly mixed with the sand. The cement and lime shall then be added and the entire mass thoroughly mixed by shoveling from one side of the platform to the other, through a $\frac{1}{4}$ " mesh screen. When the batch is of uniform color, the water shall be added.

Mortar Application.

(Skeleton frame walls—back plastered.)

The stucco shall be applied in three coats and back plastered, one coat. The whole finished $1\frac{1}{2}$ " thick, with the outside face 1" beyond the face of the lath.

The first coat shall be applied under pressure so that the mortar will be forced through the lath and completely embed the metal on both sides.

After the first coat has set, the second coat shall be applied and floated (to a true plane with wood screeds placed at 5 ft. intervals and about openings) or may be left with surface inequalities.

After the second coat has set, the finishing coat shall be applied and finished as hereinafter specified.

Back plaster coat may be applied at any time after scratch coat has set.

The undercoats shall be cross-scratched before the initial set has taken place and shall be thoroughly wetted before the succeeding coats are applied. The finishing coat shall be kept moist for at least two days longer, either by gently spraying with water after the mortar has hardened sufficiently to permit it, or by hanging wet burlap or other fabric over the surface.

Mortar Application.

(Skeleton frame walls backed with building paper.)

Standard 40 lb. building paper should be applied across studs. Then $\frac{3}{16}$ " pencil rods should be applied vertically over face of studs—specifications for application of lath as heretofore mentioned.

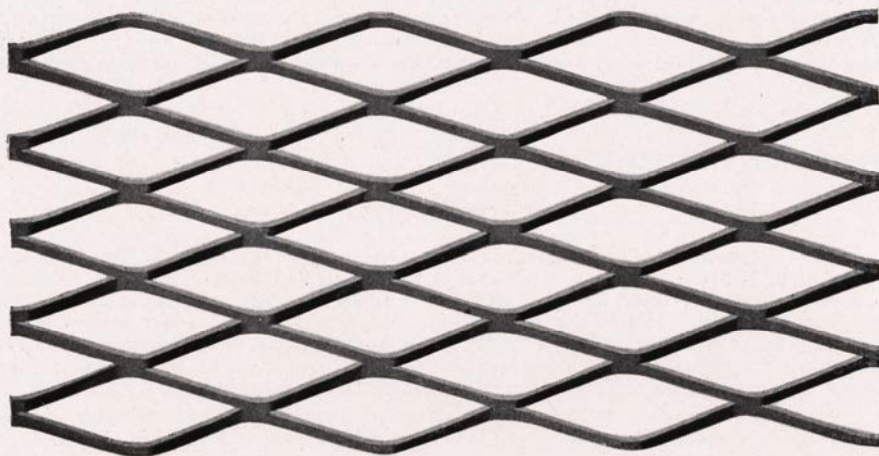
The stucco shall be applied in three coats. The whole finishing $1\frac{1}{2}$ " thick, with the outside face 1" beyond face of lath.

The first coat shall be applied under pressure so that the mortar will be forced through the lath and completely embed the metal on both sides.

After the first coat has set but before it has dried, the second coat shall be applied and floated (to a true plane with wood screeds placed at 5 ft. intervals and about openings) or may be left with a surface of inequalities.

"Diamond Mesh" Metal Lath

There is a considerable demand in some localities for the old type of mesh shown on this page. While it is sometimes used for plastering, large quantities are also used for reinforcing burial vaults and similar work.



Actual Size of Mesh of "Diamond Mesh" Lath

Stock Sizes and Weights of "Diamond Mesh" Lath.

No.	Finish	Width of Sheets	Length of Sheets	Sheets per Bundle	Yards per Bundle	Weight per Bundle	Weight per Yard
24-ga.	Painted.....	21"	96"	9	14	47.6 lbs.	3.4 lbs.
	Cut from Galv. Sheet.....	21"	96"	9	14	47.6 "	3.4 "
26-ga.	Painted.....	24"	96"	9	16	40.0 "	2.5 "
	Cut from Galv. Sheet.....	24"	96"	9	16	40.0 "	2.5 "

DEFINITION OF LOADS.

(1) Live Loads.

People, safes, merchandise, furniture, machinery, etc. Partitions which are subject to change of position.

(2) Dead Loads.

Flooring or tiling.

Fireproof arches between the beams. Ceiling under the floor. Beams directly supporting the above. Girders, supporting the beams and in turn directly supported by the columns or walls.

Mill Construction

Mill Construction or mill design, as it is variously termed is a type of construction designed to provide the greatest possible amount of fire protection at the lowest cost.

Metal Lath is increasingly in demand for this class of building since it is readily erected in connection with wood, is at all times quickly obtainable in all sections of the country, and is easily and quickly applied. Used in connection with a non-combustible plastic covering and properly applied, it constitutes a fire resisting form of construction well adapted to take care of a great many risks or hazards and is moreover adaptable to many widely varying types of building.

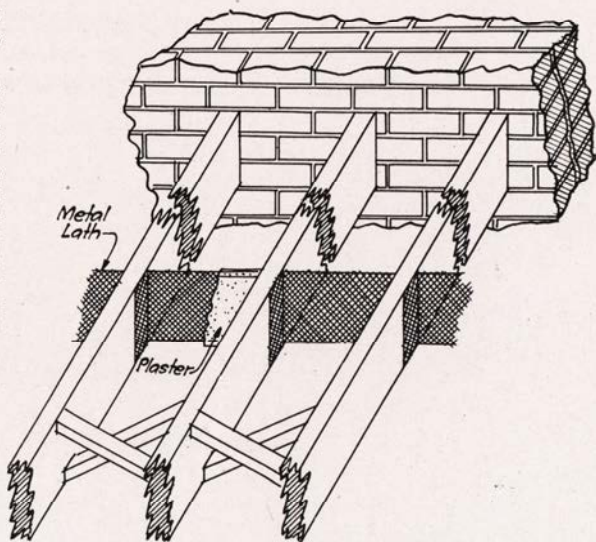
Since in mill design, much heavy timber is of necessity used, it is the function of the metal lath to furnish adequate protection for the wood that the least possible area of its surface be left exposed.

Fire Stops

Fire hazards in mill construction are materially minimized—first, by the isolation of stairways and elevator shafts by the use of light “Kno-Burn” Metal Lath partitions; second, the separation of each floor from the floor above and below, and the erection, in the floor line, of fire stops of metal lath and plaster; third, by using metal lath for the ceilings of boiler rooms, and in stock or store-rooms where materials of a combustible nature are kept, also, in manufacturing plants where production of combustible material is under way.

It is desirable that metal lath partitions be used in separating boiler rooms from the building proper and also in segregating elevator and belt shafts, that incipient fires may be localized and kept from spreading to other parts of the building.

While objections have been raised to the light joist floor construction, it nevertheless possesses certain advantages. Its safety can however, at slight additional cost, be materially increased by the use of metal lath and plaster. The channels between the joists which act as flues and permit of the rapid spread of fire can be effectively safe guarded by metal lath fire stops or a flooring may be laid directly over girders consisting of metal lath and a thin layer of concrete on top of joists.



FLOOR JOISTS WITH BRIDGING
METAL LATH AND PLASTER FIRE STOP

Fig. 36

Another type of floor which has great fire resisting value is the wide spacing of girders using beams to support the floor line. Metal lath fire stops erected between the beams of the underside of girders may be "Ceiled" by the use of "Kno-Burn" corrugated lath and plaster (see sketch) thereby affording additional protection from fire.

A suspended ceiling, with ventilators in side walls to prevent dry rot, also gives excellent protection.

Elsewhere is shown a method of constructing fire-resistive floors employed to some extent by the railroads. This is virtually a thin cinder concrete slab 2 to 2½-inch thick poured over Metal Lath used as centering. The finished floor (of wood or tile) may be laid directly on this base. This type of flooring adds to the lateral bracing and furnishes the necessary resistance to strain caused by vibration.

Protection of Beams and Girders.

The vital necessity of fire-proofing the beams and girders has been demonstrated by the serious damages sustained by the structure in many big fires where beams or girders have been insufficiently or inefficiently protected. Many failures have resulted from the fact that the unprotected beams and girders supporting the floor buckled, causing the collapse of the floors.

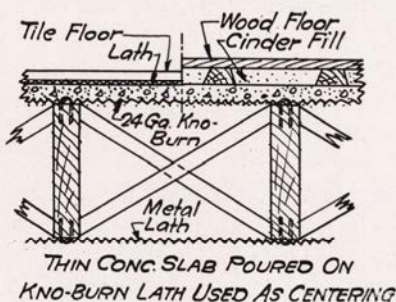
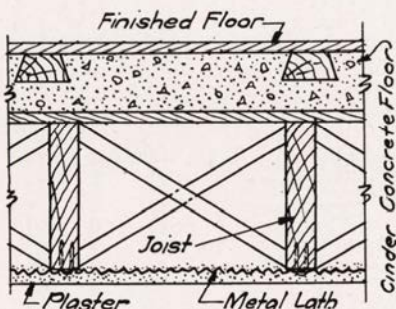
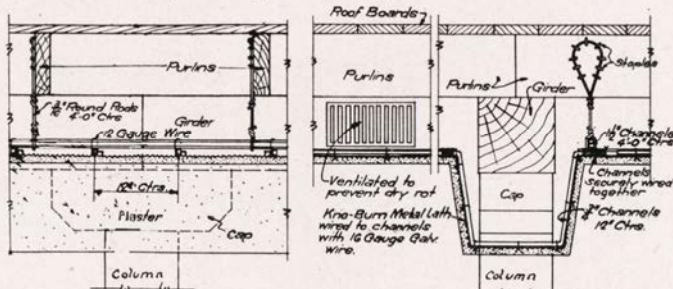


Fig. 37

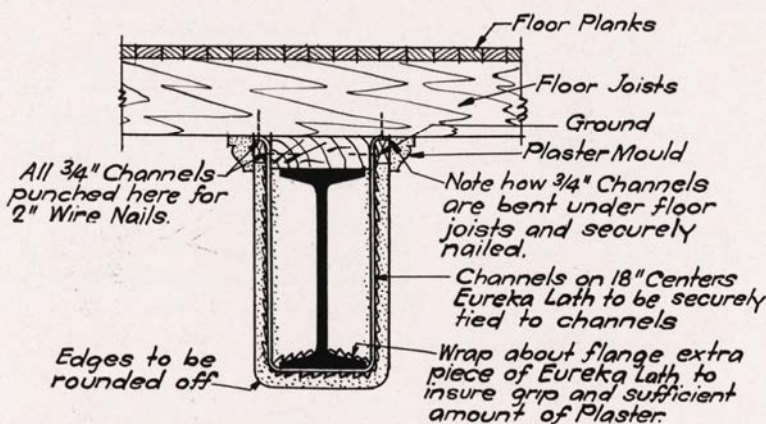


Detail of Ceiling Construction

Fig. 38

In plants where the loading necessitates the use of steel girders, beams and columns, they may be efficiently protected against fire by metal lath and plaster. It is highly essential that the furring be securely tied to the floor (see sketch) or other parts of the structure so that should the protecting screen of lath and plaster be used, that it will hold until the very last.

The method of erecting the metal lath and plaster frame is of greatest importance. No light or flimsy supports are permissible since light wire clips are quickly affected by the heat and readily distorted.



PROTECTION OF STEEL GIRDERS WITH EUREKA LATH AND $\frac{3}{4}$ " PLASTER COAT

Fig. 39

In Fig. 39 is shown how the $\frac{3}{4}$ -inch channels are bent and nailed securely to floor joists and again nailed to timber over steel I Beams. Since sharp projections spall off and are readily destroyed, the corners are rounded off to make them further fire resistive.

The use of a plaster mould under each joist where the plaster and wood come in contact gives additional protection and makes the somewhat unattractive beam more artistic in appearance.

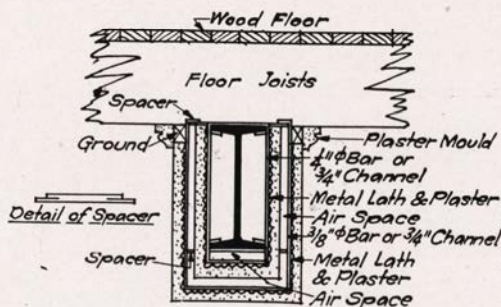


Fig. 40

Fireproofing Columns.

Since the most important load bearing members in modern buildings are the columns, it is essential that they be properly and effectively protected against fire.

Structural steel members (which commence to yield at temperatures of from 1,000 to 1,200 degrees Fahrenheit) should never be used without fireproofing.

Method of Fireproofing Columns

The importance of properly fire proofing a column increases in proportion to the load carried, which in general increases with the height of the building. Basement and lower story columns should be given more efficient protection than the lighter upper story columns and in buildings wherein are stored combustible material, they naturally demand better column protection.

The lessons taught by some of the great conflagrations proves the dependability of steel or wrought iron columns, suitably protected by a fire retardant covering of metal lath and plaster.

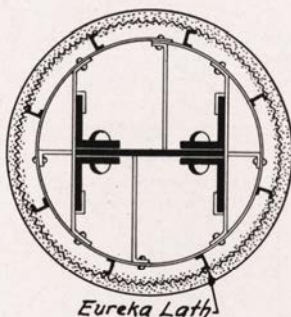


Fig. 41

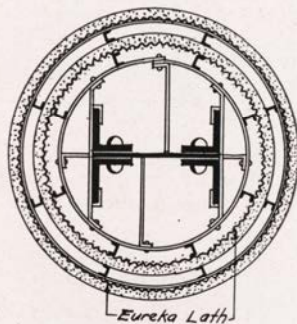


Fig. 42

Showing Use of Metal Lath in Fireproofing Columns

Preferably a double layer of lath and plaster will be used, as experience has shown that this method of treatment furnishes perfect protection for the structural members in conflagrations of great severity—the inner layer of lath and plaster being quite unaffected by the tremendously destructive fire and water action and the columns thus perfectly preserved.

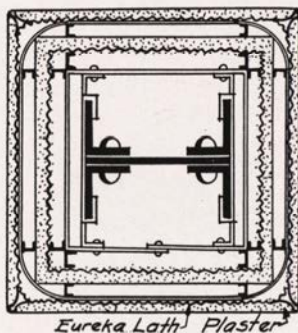


Fig. 43

Showing Use of Double Layer of Lath

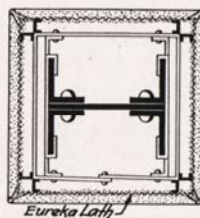


Fig. 44

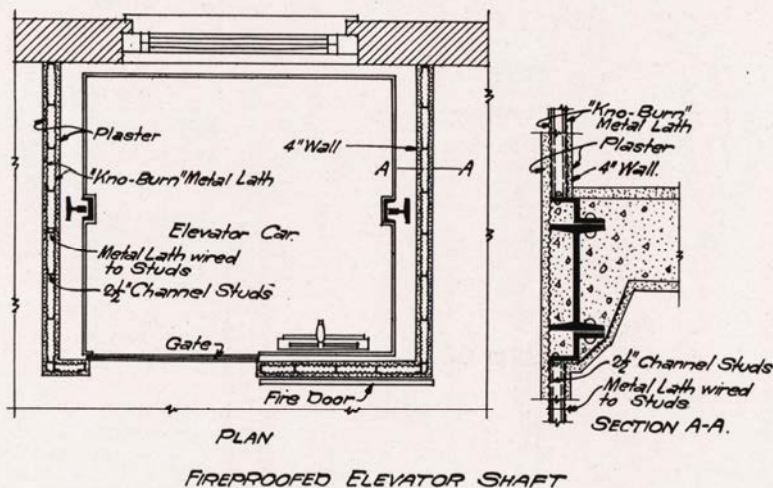
Showing Use of Single Layer of Metal Lath

Where, however, cost is an essential factor the single layer of lath and plaster will fulfill normal requirements if care is used in its erection. The framing must be of sufficient strength and weight and properly anchored to the structural member—the metal lath being furred away from the member and

plastered with a coat of plastic material, not less than $\frac{3}{4}$ -inch thick. This treatment though showing some damage, has nevertheless efficiently prevented the destruction of the columns in some very severe fires.

Timber columns are perhaps preferable to the non-protected cast or wrought iron or steel columns, but are costly to keep in condition and constitute a decided fire risk.

Elevator and Belt Shafts



FIREPROOFED ELEVATOR SHAFT

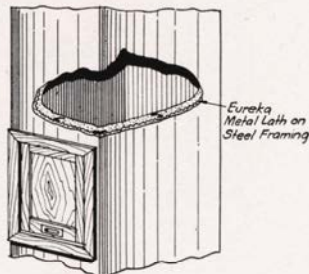
Fig. 45

The effectiveness of much fire resisting floor construction is practically nullified by unprotected stair and elevator openings.

As a matter of fact the enclosures around vertical openings, are second only in importance to fire walls in buildings containing any material fire hazard.

Stair and elevator shafts, air vent belt-ways, dumb waiter shafts, etc., form flues, which invite the spread of fire from story to story. Hence such enclosures should be of a type of construction which will adequately resist the severest possible fire and water test to which the structure may be subjected.

Metal lath and plaster furnishes highly satisfactory protection and at the same time possesses the quality of yielding sufficiently without failure to stresses caused by heat and to take up the attendant contraction and expansion.



DUMB WAITER FIREPROOFED WITH EUREKA LATH & PLASTER

Fig. 46

Detail of Dumb Waiter Fireproofed With Eureka Lath and Plaster.

Mill Construction

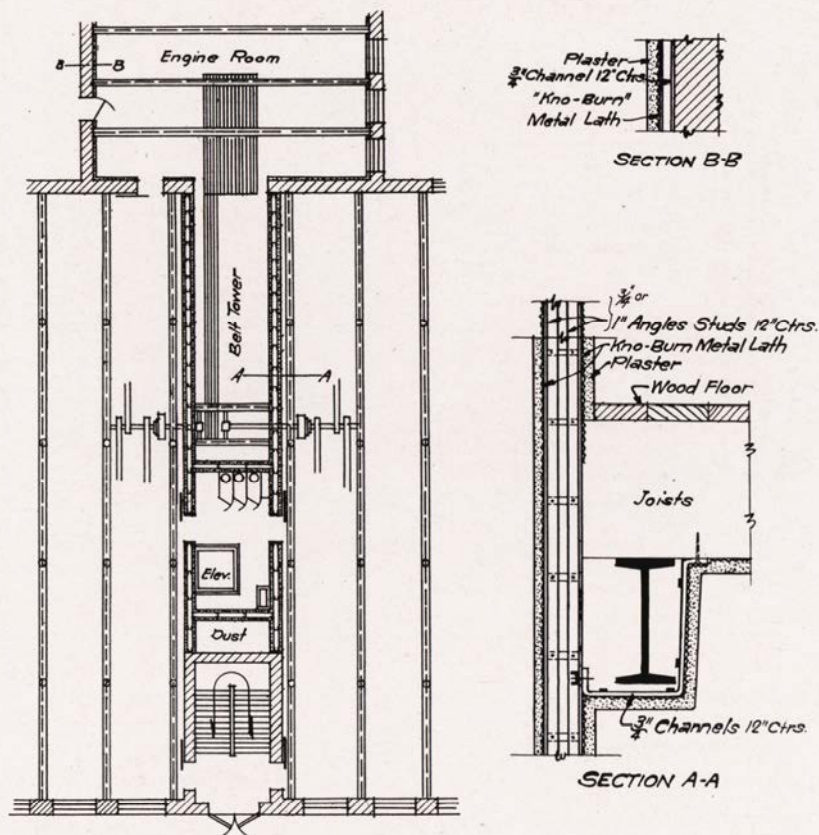


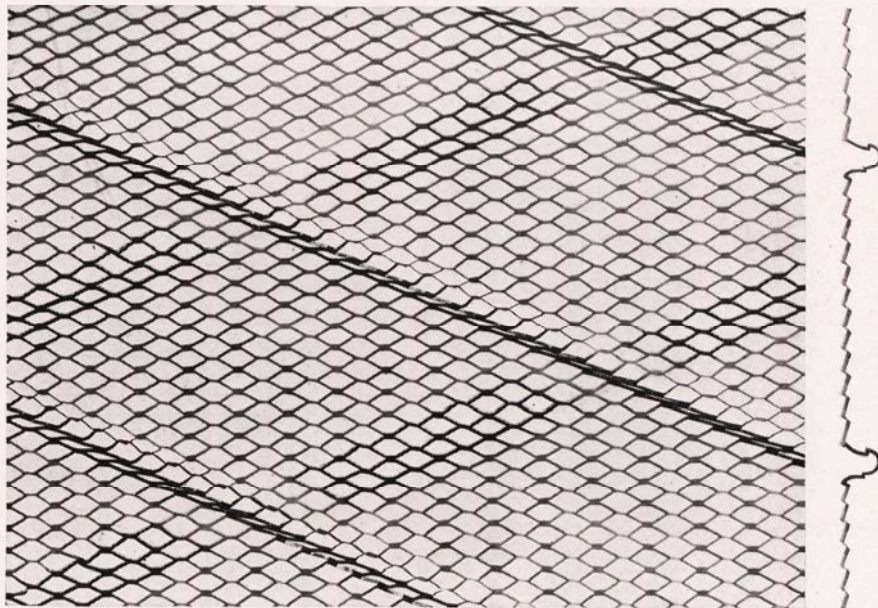
Fig. 47

Fireproofing of Belt Towers

Kno-Fur Metal Lath

(Self Furring)

"Kno-Fur" was designed to meet the existing need for a practical, economical **Self-furring** lath, thus doing away with the necessity of using the auxiliary furring strips such as are required when a flat sheet lath is used.



Section of a Sheet of "Kno-Fur" Lath, Showing the Ribs

Easy to Plaster Over.

The sheets of Kno-Fur lath are made wide enough to permit of forming ribs in them without reducing their width below that of the standard.

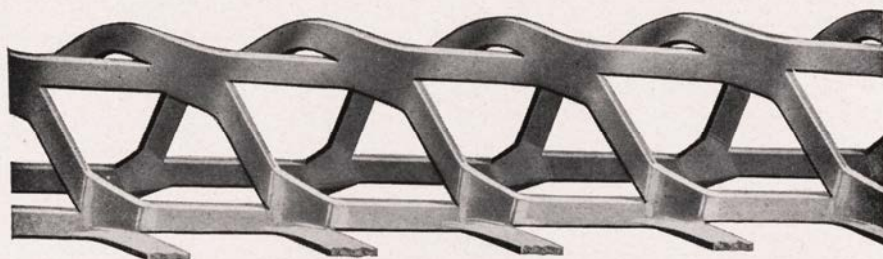
These ribs, $\frac{1}{2}$ -inch deep, act as furring strips and are placed diagonally across the sheets to coincide with the diagonal strands of the diamond shaped meshes. They have the appearance of a bridge or roof truss which adds very materially to the strength of the lath and are formed of an **open** mesh work which permits the plaster to flow around every strand thus completely embedding the whole rib.

Kno-Fur has thus a very distinct advantage over laths wherein are used ribs or ridges of solid metal. For the plaster will not "key" to these solid ribs, hence there frequently results a crack along the line of the rib. Furthermore in producing a lath combining a mesh work with solid ribs it has been found difficult to obtain a mesh that would be easy to plaster over.

In Kno-Fur these drawbacks have been satisfactorily overcome. After the plaster is applied each rib becomes virtually a reinforced concrete beam making the finished wall extremely rigid. This quality permits the use of "Kno-Fur" on unusually wide spacing.

Particularly Desirable for Stucco Work.

"Kno-Fur" metal lath is particularly adapted for use on exteriors as a support for stucco. It has the "Kno-Burn" type of mesh, and has all the excellent qualities of that popular material. It is the ideal metal lath to use in the overcoating of old houses, which process is described in detail on pages 61 and 62. The ribs permit it to be used right over the old weatherboarding without any other furring, or it can be applied directly to the sheathing if the weatherboards must be removed. "Kno-Fur" is also an economical lath to use in the construction of small outbuildings, such as garages, sheds, etc., where a wide spacing of studding can be used.



Enlarged Detail of "Kno-Fur" Rib

**"KNO-FUR" EXPANDED METAL LATH
Stock Sizes and Weights**

No.	Sheets per Bundle	Size of Sheets	Yards per Bundle	Weight per Yard, Lbs.	Weight per Bundle, Lbs.
27-ga. Reg.*	9	22 x 96"	14 $\frac{2}{3}$	2.62	39.0
26-ga. Spec.†	9	19 $\frac{1}{2}$ x 96	13	2.40	31.2
24-ga. Spec.†	9	20 $\frac{1}{2}$ x 96	13 $\frac{2}{3}$	3.08	42.0
24-ga. Reg.*	9	22 x 96	14 $\frac{2}{3}$	3.8	56.0

*"Kno-Fur Regular" is manufactured from a special metal which is proof against acids and not quickly affected by any form of corrosion. This lath has the "Kno-Burn" mesh.
†"Kno-Fur Special" is manufactured from standard steel sheets and has the "Eureka" mesh.

Comparative Weights of Various Partitions

With Metal Lath

	Weight per sq. ft.
2" Solid partition plastered on 24 ga. Kno-Burn Metal Lath...	12 pounds
3" Hollow partition plastered on 24 ga. Kno-Burn Metal Lath	11.16 pounds
4" Hollow partition plastered on 24 ga. Kno-Burn Metal Lath	11.38 pounds
6" Hollow partition plastered on 24 ga. Kno-Burn Metal Lath	12.05 pounds

With Other Material

2" Terra Cotta Tile Furring Unplastered.....	8.0 pounds
3" Terra Cotta Tile Partition Unplastered.....	10.0 pounds
4" Terra Cotta Tile Partition Unplastered.....	16.0 pounds
5" Terra Cotta Tile Partition Unplastered.....	22.0 pounds
6" Terra Cotta Tile Partition Unplastered.....	25.0 pounds
8" Terra Cotta Tile Partition Unplastered.....	33.0 pounds

Add to the above 6 pounds per square foot for plaster on each side.

Industrial Housing

ONE of the big problems confronting the industrial world is the stabilizing of the labor supply. It is now conceded that the high percentage of labor turn over, which spells waste both in production and wage earnings, can be materially decreased by improving the housing conditions of the employee.

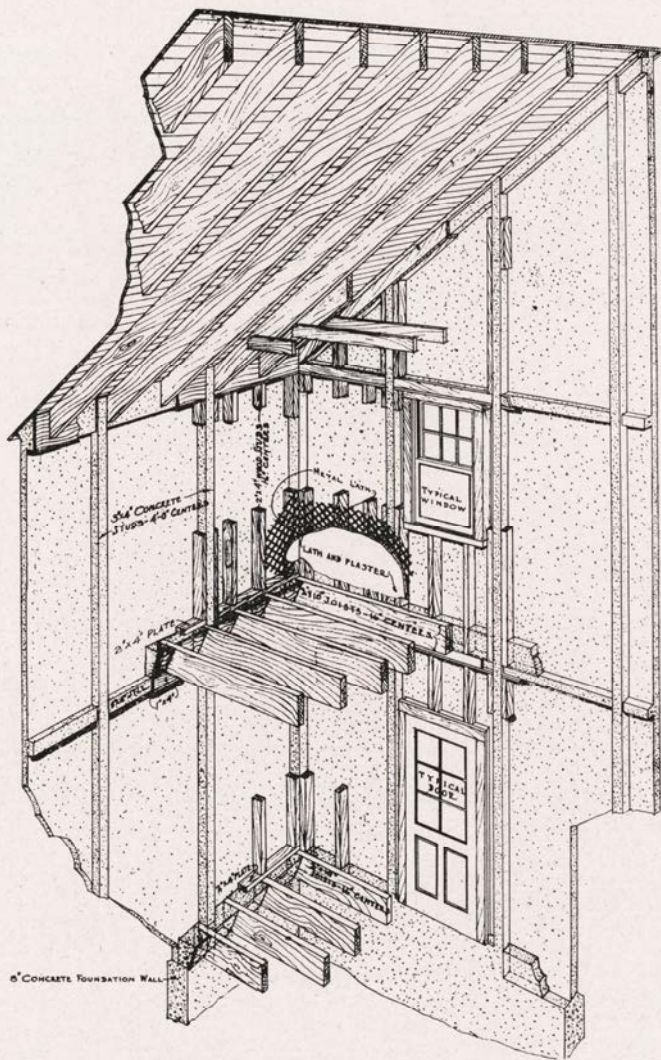


Fig. 48. An Ingenious Method of Construction Designed by Ballinger & Perrot

Industrial Housing, is in the final analysis, just common sense building minus frills. Yet it is building which calls for the best efforts of skilled brains—if the defects of the earlier housing developments are to be eliminated and a building

NORTH WESTERN EXPANDED METAL CO. CHICAGO, ILL.

be secured which is at once economical in cost, yet permanent, comfortable and attractive.

Many eminent builders now concede that the metal lath-stucco house most nearly fills the bill. Permanent, fire resisting, comfortable, attractive and also vermin-proof and sanitary, its first cost is moderate and the expense of subsequent up-keep is reduced to a minimum.

Susceptible of infinite differentiation of color and finish it also possesses unlimited architectural flexibility, permits the desired note of variety which redeems the housing development from the hideous monotony which has proven a serious drawback to the earlier developments.



Fig. 49

Government investigations covering 52,176 houses prove that 48% of these are single houses, 35% double, and 11% terrace or "row" houses and tenements—the four or five room house seeming to be theoretically correct, serving equally well the needs of the larger foreign families as well as affording the privacy demanded in the average American home.

An interesting system of Metal Lath and Stucco construction devised by the well known Eastern Architects—Messrs. Ballinger & Perrot, which combines economy with rapidity of erection is here presented.

A main frame of concrete studs and caps and a wall surfacing of cement stucco is used. The concrete foundation wall is poured from a traveling mixer with loader. The first floor wood joists are then set in place and the foundation

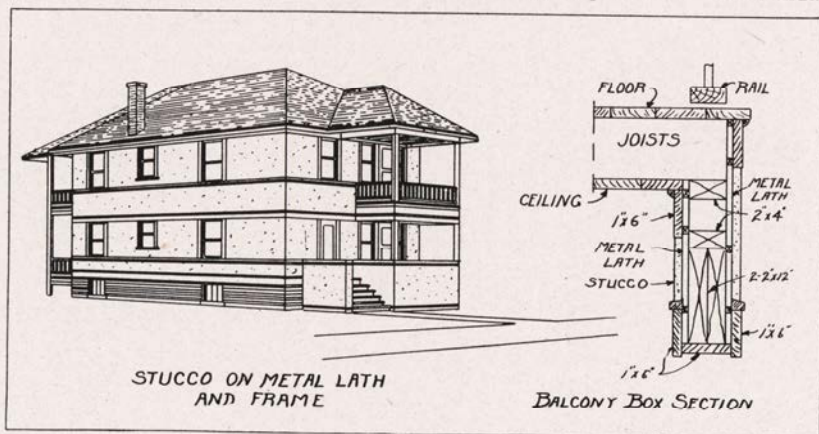


Fig. 50. A Commodious Two Family Metal Lath-Stucco Building.

wall, studs, joists and rafters are then erected, in the usual manner, but every fourth stud is doubled, allowing a 3x4 inch space between, which is filled with concrete to form a concrete stud. A ledger board with bottom attached, is, at the second floor and roof levels, placed over the studs and so arranged that when

filled with concrete they form beams, which, with the vertical concrete studs make a homogeneous concrete frame.

When completed, the concrete studs are continuous from foundation to roof. The second floor joists are set on top of the lower ledger board, then the second story studs and so on. When the frame is completed (including the party wall) and the roof is on, heavy waterproof building paper (see illustration on page 54) is fastened to the outside of the exterior wall studs, leaving the space between the doubled studs open to receive the concrete. Over the waterproof paper the metal lath is stretched, the concrete studs being reinforced by the steel rods fastened to the metal lath. The ledger boards have a bottom wood piece, or form so that when filled with concrete they act as beams to carry the floor joists and roof rafters.

A 1½ to 2-inch concrete coat is then applied to the exterior, the desired color being added while the concrete is being mixed.

The two-flat stucco and metal lath building is popular with the higher paid employees, not only because it is more pretentious in appearance, but for the sake of the rental received from the unoccupied flat which helps pay the carrying charge and amortization of the whole house, the owner subsequently obtaining not only a home but an assured income.

A well planned dwelling of this type which does not in cost greatly exceed a one family house of the same floor area is shown in Fig. 50.

The Modern Hospital

Since the principal purpose of a hospital is to enable the sick whom it shelters to recover in the shortest possible time, its site and construction should be chosen with special reference to the freest possible admission of fresh air and sunshine, and sanitation, and the interior arrangement so designed as to contribute to the greatest comfort of its inmates and facilitate their care.

Many authorities claim that the maximum usefulness of a hospital endures but for from 20 to 25 years, since the rapid changes of medical opinion as to methods of treatment affect the internal arrangement to a very considerable degree.

A sanitary type of base recommended for hospitals, kitchens, bath rooms, closets, etc. Note that the old wood base board with its open space which harbors vermin and dirt is eliminated. The neatly moulded base board of cement and metal lath is formed by the plasterer at the time the partition is constructed. The rounded corner allows perfect cleansing.

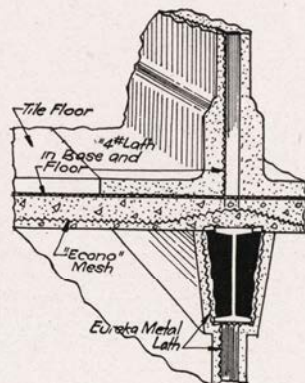


Fig. 51

But while there is a reasonable certainty that a hospital will never become superfluous in the district in which it is situated, yet in view of their usual heavy indebtedness it is generally essential that the cost of erection be kept as low as is compatible with efficiency. And since metal lath and stucco combine permanence with low first cost, this type of construction is today in much demand for buildings of this class.

Metal Lath and Stucco is especially indicated because of its fire resisting

qualities, since while fortunately there have been recorded comparatively few large hospital conflagrations, yet there are unquestionably a very large number of small hospital fires to which publicity is not given.

It is most essential therefore that too much reliance should not be placed on fire fighting service, since these buildings are seldom insured.

Transforming an Old Building.

To save expense, old buildings are frequently reconverted for hospital use, and in such cases the wood frame, in the items of sills, studs, joists and rafters can be retained, but their retention made with an absolutely complete and carefully installed system of fire stops within the halls, floors and roofs.

The outside walls of such a building should be overcoated with cement mortar, stucco and metal lath, the inside surfaces and the partitions with plaster and metal lath thus insuring a decided gain in the insulating value of the walls, protection from vermin, and a vastly increased resistance to fire.

In erecting a new building the same general principles of fire proofing recom-



The New City Hospital, Louisville, Ky., is a good example of modern hospital construction. "KNO-BURN" was used in the interior work.

mended elsewhere for other structures should be applied, with particular reference to the safe guarding of elevator, dumb waiter and other shafts by means of which fire might rapidly spread.

The ward is the unit of hospital construction and the essential problem of planning a hospital is in the designing and grouping of these units. In order to obtain the maximum amount of sunlight some authorities recommend an intermediate position for the long axis of the wards, i. e.—northeast to southwest and northwest to southeast, others favoring a north to south direction. The amount of floor space per bed ranges from 100 to 125 superficial ft., with at least a 12 ft. ceiling. This gives from 1,200 to 1,500 cubic ft. for each bed.

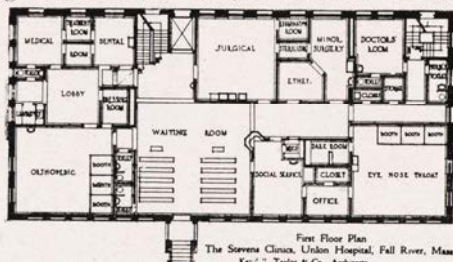


Fig. 52
First Floor Plan of Union Hospital, Fall River, Mass.

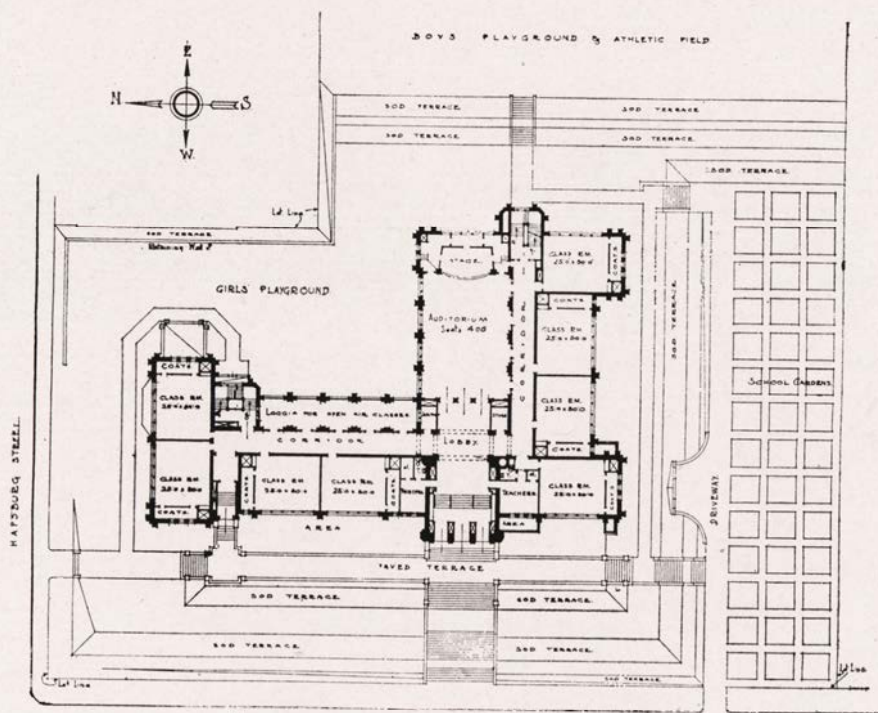
Floors of entrance hall should be as nearly as possible on a level with outside porch to facilitate the carrying in of stretcher cases.

Interior walls of the Admission Department (containing offices, receiving and examination rooms, etc.), should have a smooth, impervious finish to permit frequent cleaning. Ward doors are preferably 3 ft. 6 in. wide and framed without moulding.

The Responsibility of School Building

SUCH catastrophes as the Collingwood and the Peabody school disasters are gradually awakening the public to the need of making these educational institutions fire safe.

Its fire retardant qualities and economy explain why metal lath is becoming an important factor in this class of building. It use effects considerable saving of floor space and total area. Metal lath and plaster walls are non-conductors of sound and heat and vermin proof. Also the lightness of the structure will usually permit of a shallower foundation than would be required for the ordinary brick building with 14" or thicker walls.



FIRST FLOOR PLAN—THE HOFFMAN PUBLIC SCHOOL, CINCINNATI, OHIO.
Samuel Hannaford & Sons, Architects.

Fig. 53

Beyond question the ideal school is the one-story structure, **without** basement or with basement entirely cut off from the first floor—access being obtained from outside. But in cities, etc., where this is not feasible there should be as few stories as possible, adequate exits (not less than two for each floor and as far apart as possible) being provided, so that the building, if fireproof, may be completely emptied in three minutes.

Where there are four or more classrooms on a floor, each floor should be divided into two or more nearly equal parts by a fire wall extending from ceiling to 3 ft. above roof, thus should fire start on one side, the pupils can be marched in safety to the other and thence outside. No doors should be permitted in these fire walls—the only communication from one section to the other being by way

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of doors and balcony leading around the end of fire wall through the open air.

In some sections it is permissible to use for elementary schools, 3' wide stairs—a 4' width being allowable for grammar or high schools—the stairs of the latter being provided with a 10" tread and a 6" riser.

Stairs should be continuous if possible from corridor to outside exits. Outside doors are to be as wide as the stairway and to open outward.

All stairs should be enclosed in fire proof material so as to entirely separate them from the rest of the building. Partitions separating class rooms should be fire retardant—of plaster on metal lath. Boiler rooms, and the floors, walls and ceiling of basement should be similarly protected, also manual training and domestic science classrooms and laboratories. Fireproof vaults should be arranged in basement for school waste, ashes, etc. (two small vaults being preferable to one

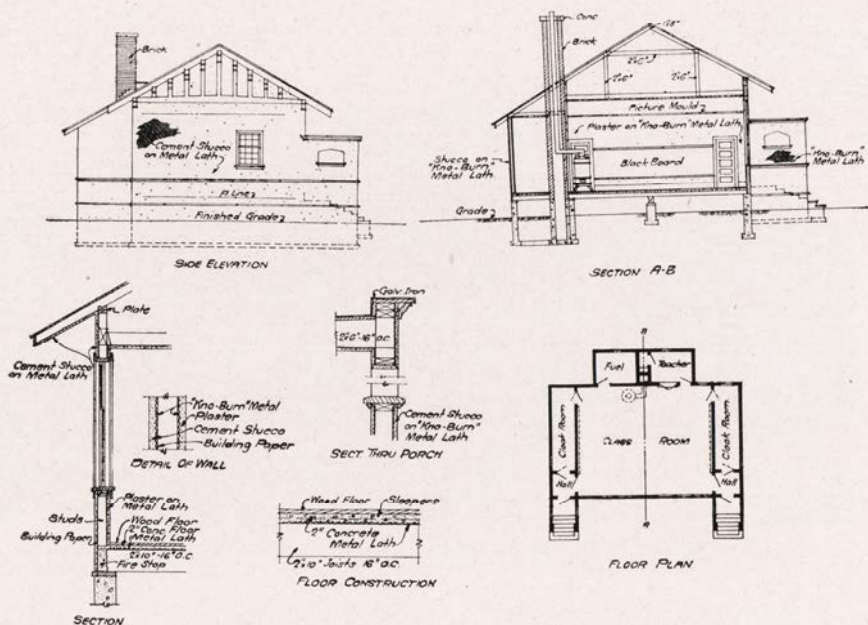


Fig. 54

Suggested Plan For Country Schoolhouse

large). All other shafts, flues, and chutes also to be of fireproof material.

All spaces between ceilings and floors should be fire stopped with metal lath and plaster also corrugated lath pocket filled with cinder concrete, over all partitions on floor below. All spaces between ceilings and roofs should also have fire stops of metal lath covered with cement mortar so arranged that there shall be no area of more than 40' in any direction not cut off.

Every room and corridor should be equipped with automatic sprinklers. Windows are preferably of wire glass, and in the larger schools smoke proof, stair towers, connected to the main structure by horizontal bridges open at the side, are highly desirable.

It is advisable that furniture should be attached to the floor.

Planning Theatres for Safety

HUMAN safety is of first importance in theatre design and management. Practically every civilized country has at one time or another experienced severe conflagrations in theatres or other places of amusement, attended by distressing loss of life. And that the lessons taught by such fires are bearing fruit is evidenced by the improvement in our own modern play houses and moving picture theatres, in a very large number of which Kno-Burn and other types of North Western expanded metal is now being used.

Theatres may be roughly divided into three main sections—entrances, auditorium and stage section. It is desirable that each should be separated by fire-proof walls such as brick furred with metal lath. Concrete with stucco ornamentation is favored for the exterior walls or these may be of masonry. Emergency exits and stairways when located inside of theatres should be separated from the auditorium by a fire retardant partition not less than 4" thick. Booths for moving picture apparatus, boiler rooms, meter closets, dressing rooms, and property store rooms should be so constructed that incipient fires may be localized.



Keith's Theatre, Louisville, Ky., Is One of a Vast Number of "Kno-Burn" Theatres.

Requirements as to the width of aisles vary in different sections but all authorities agree that the width should be increased toward the exit and that wherever possible that they be planned with gradients or inclines instead of steps.

For the foyers, lobbies, etc., Mr. C. H. Blackall (who is recognized as our foremost authority on theatre construction) recommends not less than 2 sq. ft. of space per capita.

Entrance doors should never be less than 5 ft. wide in the clear and emergency exit doors not less than 4 ft., all to be **outward** and to be hung so as not to obstruct width of passage.

Stairways should be planned with direct course, easy rise, wide treads, and frequent landings and be equipped with a wholly or partially independent lighting system.

The floors of the building are preferably of concrete and Chancelath. This renders them fireproof, and easily cleansed—hence sanitary. Wherever possible floors inside main entrance should be on a level with the outside sidewalk, and stores, offices separated from the theatre proper, by fire retarding walls. Sufficient space between rows of seats should be allowed, and not more than 11 seats in any one row is recommended. Adequate fire extinguishing apparatus should be always instantly available.

Overcoating—Old Houses Made New

IN nearly every locality there are sound but weather-beaten and shabby frame houses whose style of construction is out of date. These old houses, often invested with sentimental associations can be given a new lease of life and transformed into handsome modern residences by means of overcoating with stucco and Kno-Burn Metal Lath.

Some of these require no alteration whatever—the exterior being simply covered with the stucco applied over the metal lath. In other cases the owner will wish to make additions or alterations to enhance the appearance and add to the convenience and comfort of the home.

Before deciding on remodeling however, the house should be very carefully examined from cellar to garret. The sill and studding should be inspected for if the framework of the building is in poor condition, the expense of remodeling may not be justified.

If the stucco overcoat is to be put on over the old weatherboards, the whole surface should be gone over carefully to see that all the boards are



"Overcoated" Residence of Mr. C. F. Hurburgh, Galesburg, Illinois

securely nailed on.. If the paint on the weather boards is in good enough condition to prevent the wood from absorbing water from the wet stucco, 24 gauge painted Kno-Fur (minimum weight 3.08 lbs. per sq. yard) may be applied right over the weatherboards. If otherwise, the whole surface should be covered with water-proof building paper before the lath is applied.

If the overcoating is applied over the weatherboards, provision should be made to extend the window and door casings so they will have the proper projection beyond the finished stucco. This can be done by placing a heavy brick moulding around the outer edges of the casing then finishing the stucco against this. If the casings are in bad condition remove them and build out the frame, to give the proper projection for new casings. In either case the sills should be extended to provide a good drip beyond the face of the stucco.

When the weatherboards and sheathings are in too poor condition to be left on, the metal lath is fastened over the old sheathing boards after covering them with waterproof paper. In this case there will be no need for altering the old trim.

Occasionally there will be found a house that has no sheathing back of the weatherboards. The metal lath is then applied directly to the wood studs.

Use a Cement Stucco (see Stucco Specifications). No more stucco should be mixed than can be applied before the mixture begins to set and not less than three coats applied. The most pleasing results are obtained by giving the last coat a rough cast which requires but little trowelling.

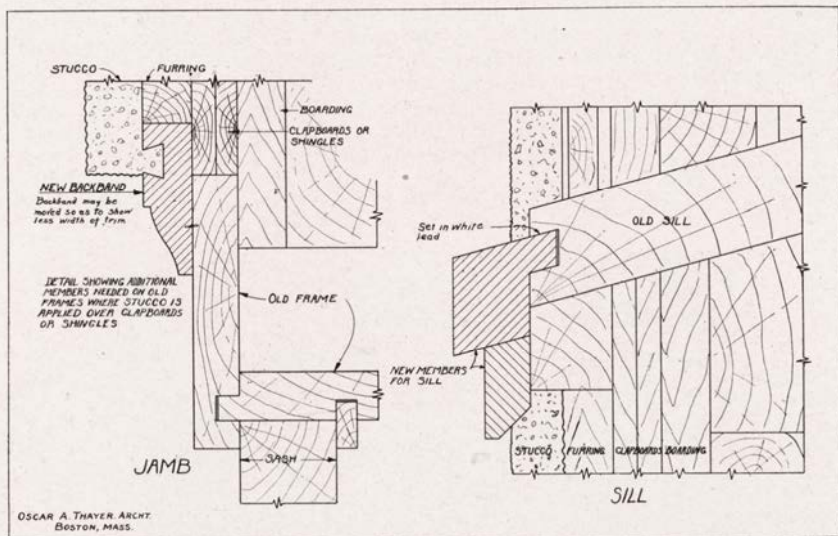


Fig. 55. Showing Method of Treatment.

The cost of overcoating varies in different localities, but if the house is sound the owner will be well repaid for the expenditure. Furthermore the over-coated house is not only warmer in winter and cooler in summer, but its rental and selling value is distinctly appreciated, while future up-keep cost is reduced. The contractor, etc., therefore, who can properly present these facts to the owner will find in "overcoating" work a new and lucrative addition to his business.

The Metal Lath—Stucco Garage

THE advantages of having his own garage—the saving of rental charges and the convenience of having the car instantly available, is so obvious to the automobile owner that each year witnesses an increased number of garages built.

The value of the property and the resulting saving in insurance premiums forcibly indicates a fire resisting construction. And of the various types available, the most popular and practical is stucco on Metal Lath.

The first cost of such a structure is moderate. It is attractive, permanent and easily cleaned, no painting and few repairs are needed, and it can be made to harmonize with any architectural plan.

While a garage of 13x24 feet interior dimensions is sufficient to comfortably house a single car, many prefer, for the moderate additional cost of building, a two car garage, since the extra space can be used for a visitor's machine, for storing tools, etc., or rented.

NORTH WESTERN EXPANDED METAL CO. CHICAGO, ILL.

The pipe frame garage built with metal lath and stucco is easily built, strong, fireproof and attractive in appearance. 2½-inch pipe uprights are set on concrete with cross pieces of 1½-inch pipe. Between the uprights are ¾-inch flat irons running from top to bottom spaced 12 to 16 inches on centers. "Kno-Fur" or Corrugated Lath is then wired to the flats and stuccoed.



The stucco metal lath garage, tool house, etc., is economical, fire-resisting and attractive.

The wood stud frame, Metal Lath stucco garage is popular and economical. This type of garage has a rigid frame of 2x4 inch wood studs spaced 12 to 14 inches on centers and properly braced. 1-inch sheathing is then fastened to the wood studs, then covered with a waterproof tar felt building paper, over which

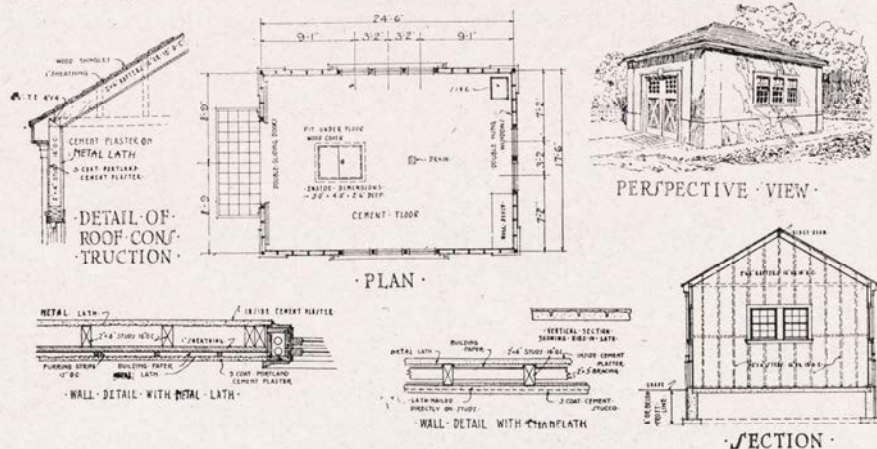
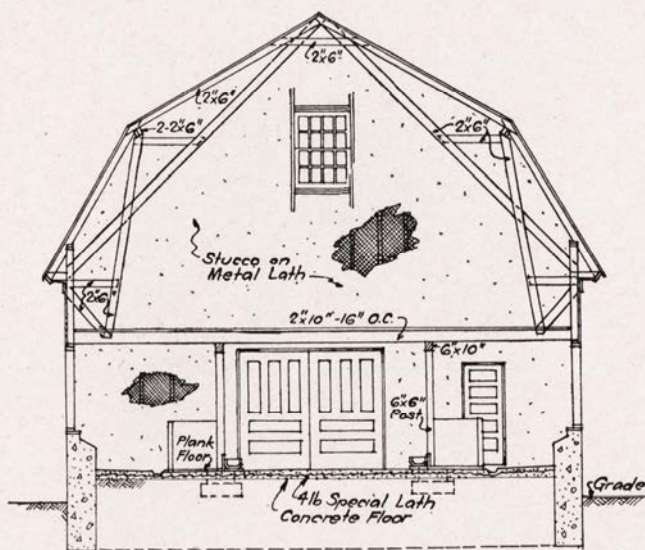


Fig. 56

Plan of Metal Lath and Stucco Garage with wood stud frame.

is applied "Kno-Fur" or Corrugated Metal Lath. If "Kno-Burn" is used, it must be furred out with furring strips. The interior walls are then covered with metal lath, coated with cement mortar. Windows and doors are set in 1½-inch channel iron frames of proper dimensions which are tap bolted to the pipe frame.

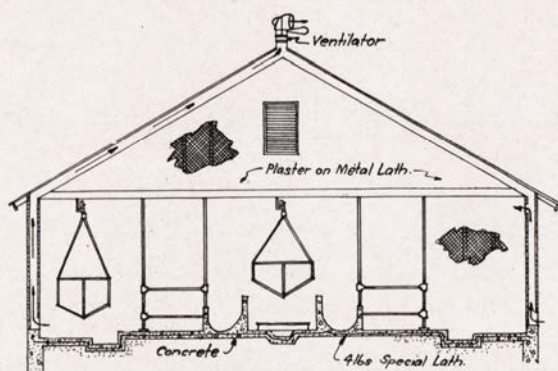
Farm Construction



CROSS SECTION

Fig. 57

Stucco and Metal Lath Barn with Channel at the Roof (Note the Large Storage Space in Loft)



CROSS SECTION

Fig. 58

Farm Barn—Stucco on a Base of 24 Gauge Kno-Burn Lath

Concrete Cistern and a Chicken House

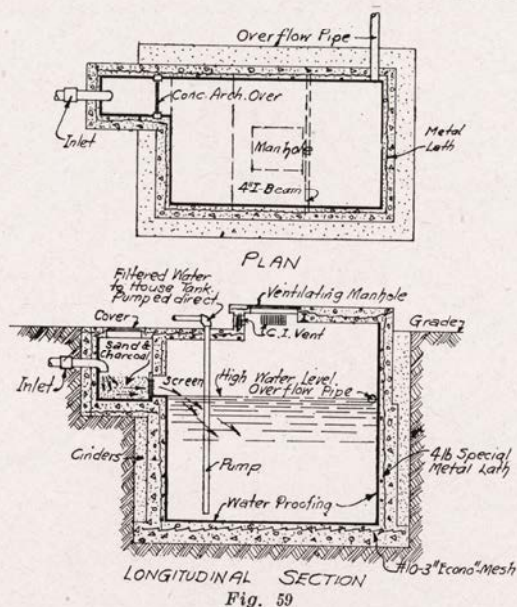


Fig. 59
Detail of Reinforced Concrete Cistern

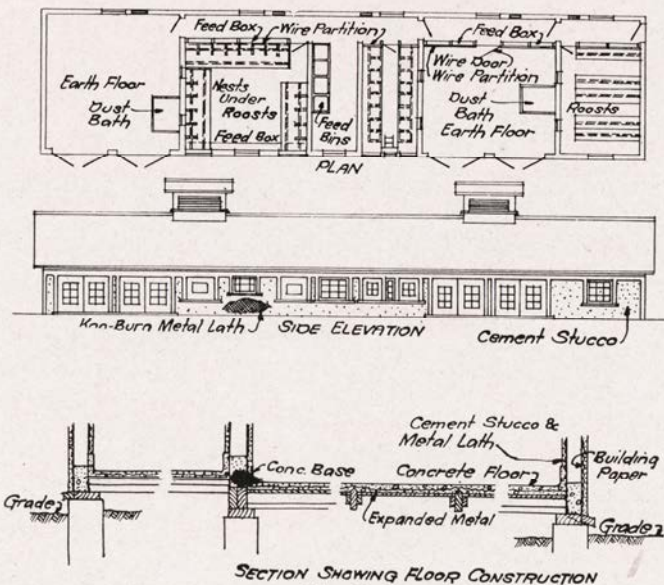


Fig. 60
Chicken House, Metal Lath and Stucco

Farm Construction

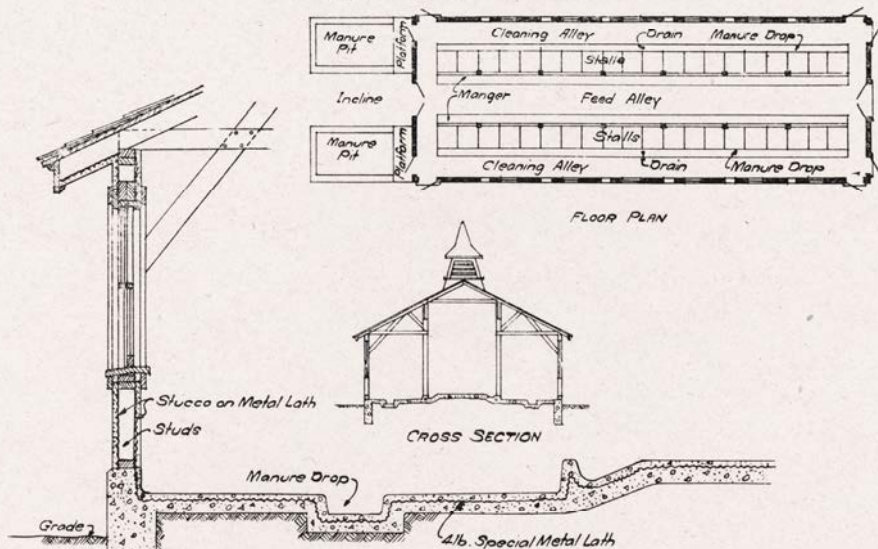


Fig. 61

Metal Lath and Stucco Barn

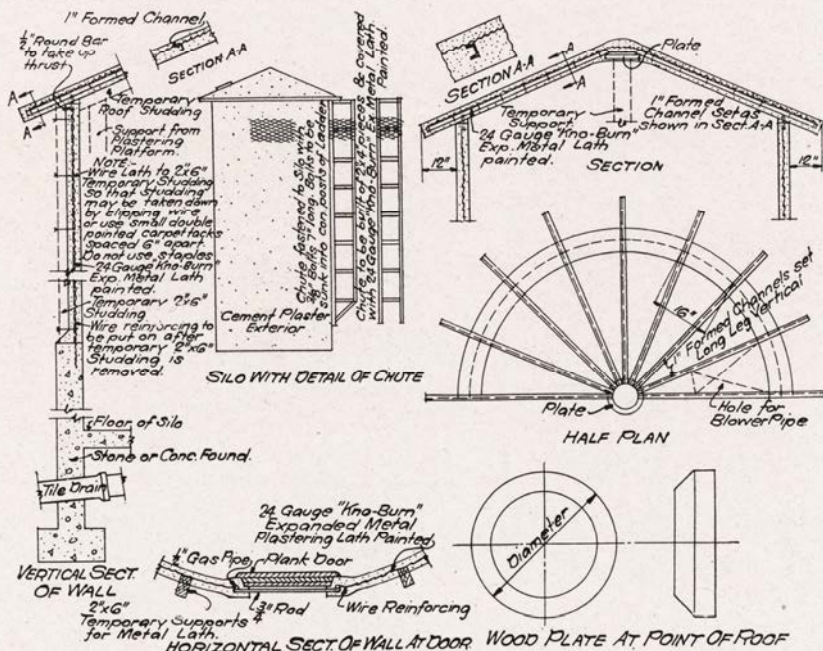


Fig. 62

Metal Lath Cement Silo, showing details of construction.

Burial Vault Reinforcing

Burial Vault Reinforcing is manufactured from sheet steel of the highest grade. The size of the mesh is shown in the illustration.

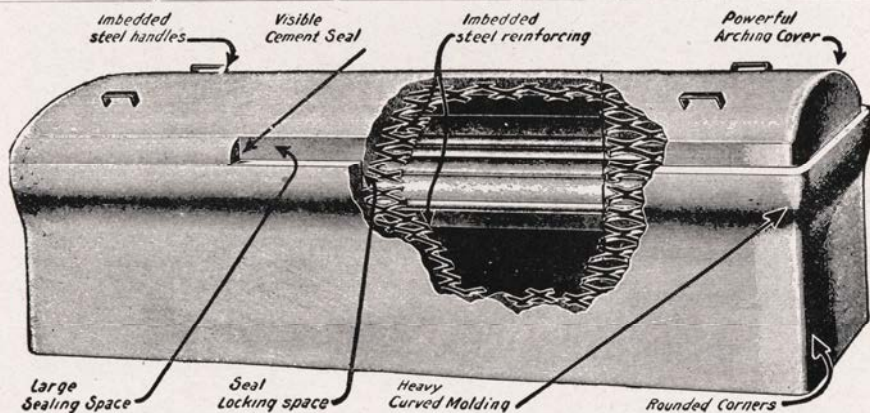
Burial Vault Reinforcing is furnished in sheets 24 inches wide and 96 inches long with the long dimension of the mesh running lengthwise of the sheets.

It is painted with asphaltum paint.



B. V. Reinforcing—Actual Size of Mesh

No.	Weight per Yard	Yards per Bundle	Sheets per Bundle	Weight per Bundle
24-ga.	3.4 lbs.	16	9	54.4 lbs.
26-ga.	2.5 "	16	9	40 "



Cement Burial Vault Reinforced with B. V. Reinforcing. Courtesy Norwalk Vault Co.

There is a growing demand for Reinforced Cement Burial Vaults and Cement Caskets. Properly constructed and hermetically sealed, they are air tight, water-proof and unbreakable and should last indefinitely, perfectly preserving both casket and remains.

Proper reinforcing is, however, exceedingly essential since the vault must of necessity be strong enough to bear the weight of the earth and also to stand up under handling should it ever be necessary to disenter the casket for burial elsewhere. Our **Burial Vault Reinforcing**, illustrated above, gives the most excellent satisfaction.

Econo Sheathing Lath

A felt-backed or sheathing lath of high merit designed especially to enable you to successfully meet competition on work where a material of this nature is desirable.

Sheathing and Metal Lath Erected at ONE OPERATION— A Time and Labor Saver

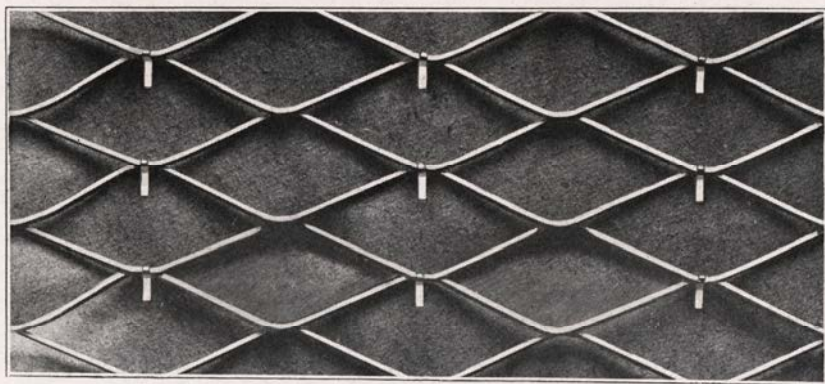
For months our experts have been engaged in perfecting the ECONO SHEATHING LATH here presented to you. On work where a heavy supporting vehicle is required, or where it is desired to use a material which combines a plastering lath and sheathing, ECONO SHEATHING LATH will economically and efficiently meet all requirements of architect, contractor or owner.

This illustration shows just what it is—a 16 gauge, 3" mesh expanded metal of the ECONO type securely riveted on to a backing of heavy waterproofed building felt by steel binder ribbons.

NOTE PARTICULARLY. All the steel with the exception of the binder ribbons is on the face of the felt, consequently every ounce of the strength of the metal is brought into play—equal reinforcing being provided in every direction, thus impartially distributing the stress over the entire area.

Tends to Prevent Cracking of Plaster

The strands run diagonally, slanting in both directions. Hence, no matter in what direction a crack may start to form, a strand of steel will be found lying across its path to resist the tendency.



Insures a Perfect Bond—Saves Plaster

The slight surface roughness and rectangular shape of the strands of expanded metal act as a "shelf" which prevents the mortar sliding or slipping and the bonding properties are further heightened by the downward dip and small size of the strands and the diamond shape of the mesh.

The fibres of the rough surfaced waterproof felt work into the plaster; it thus becomes an integral part of it while the perforations afford an additional "key" for the plastic covering. Fully 25% of the scratch coat of mortar is saved by the use of Nemco Sheathing Lath.

Rigid—Easily Handled—Quickly Erected

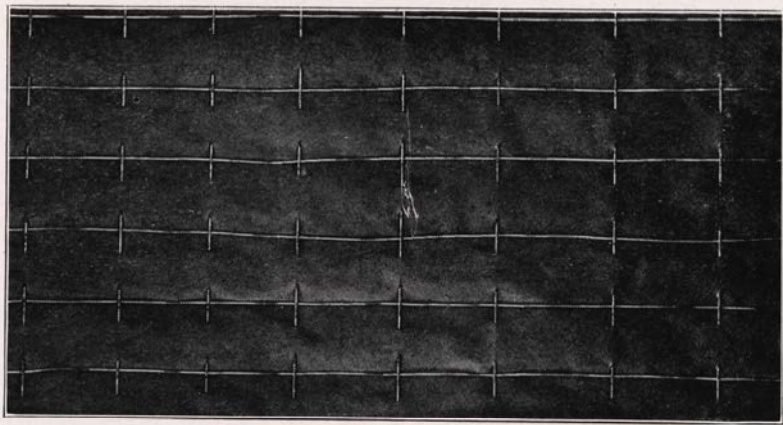
ECONO SHEATHING LATH holds its shape better than any material of this nature yet put on the market. The flat strands of the diamond-shaped mesh give it the necessary rigidity, slightly increased by the steel riveting bands on the back of the paper. The large sheets each measure 3x8 ft., thus 24 square feet of surface area is covered at one handling—the sheathing and plastering lath being erected in **one** operation.

The backing for ECONO SHEATHING LATH is an excellent grade of heavy waterproof building felt, moisture proof and weather tight—and sufficiently tough and strong to withstand all ordinary usage during erection without injury. It furthermore possesses markedly better heat and sound insulating properties than the ordinary sheathing material.

ECONO SHEATHING LATH is furnished painted only, in sheets measuring 3x8 feet. It is packed 24 sheets (64 sq. yds.) to crate. Weight per sq. yd. 3.4 lbs. Crated weight, 245 lbs.

NEMCO Sheathing Lath

In NEMCO SHEATHING LATH the 14 gauge galvanized wires are woven through and across the face of a tough water proofed building felt, so as to secure the maximum efficiency of the two materials. On exterior work the felt backing waterproofs the superstructure, preventing the wet plaster from coming in contact with the wood. It also prevents waste of plastering materials. Every bit of the "mud" is utilized, this amounting to perhaps 20% of the scratch coat.



The heavy galvanized reinforcing cannot rust or corrode since it is embedded in the plaster and will last the life of the building.

NEMCO SHEATHING LATH eliminates a great amount of cracking caused by the shrinking of timbers when ordinary bases are used. It can be erected with the utmost rapidity by unskilled workmen and is easily plastered over.

NEMCO SHEATHING LATH, is used with distinct economy in housing projects, fine residential work, garages, etc., for both exterior and interior plastering and for remodeling old buildings.

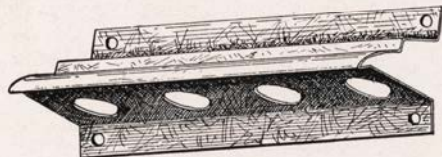
NEMCO SHEATHING LATH is furnished in sheets measuring 6 feet 10 inches long by 33 inches wide. Weight per sq. yd. 2.3 lbs. Packed 50 sheets (105 sq. yds.) to crate. Shipping weight crated, 240 lbs.

Lath Accessories

NEMCO CURVED POINT BASE SCREED

(HOT GALVANIZED)

For Cement or Composition Base.
Made for $\frac{1}{2}$ -inch ground only.



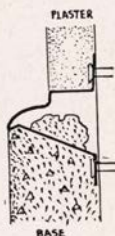
Cut about $\frac{1}{2}$ actual size.

26 Gauge.

Stock Length, 10 feet.

Shipping Weight, 175 lbs. per 1,000 feet.

The right hand sectional cut shows the end view.



NEMCO BULL NOSE BEAD

(HOT GALVANIZED)



Cut about $\frac{1}{2}$ actual size.

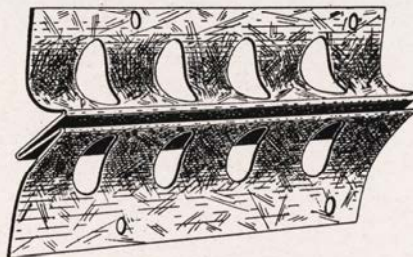
This corner bead has a nose radius of $\frac{3}{4}$ -inch.

Shipping weight, 250 lbs. per 1,000 feet.

Note: Clips are necessary with this Bull Nose Bead. An extra charge is made for these. Include them in your order.

NEMCO PICTURE MOLD

(HOT GALVANIZED)



Cut about $\frac{1}{2}$ actual size.

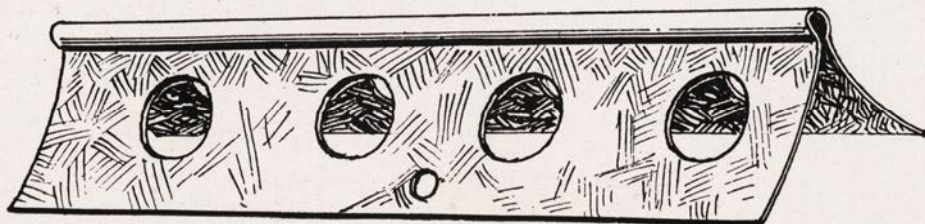
Stock length, 10 feet.

26 gauge. Shipping weight, 267 lbs. per 1,000 feet.



Lath Accessories

NEMCO CORNER BEAD



Cut actual size.

Stock Lengths, 6, 7, 8, 9, 10 feet.

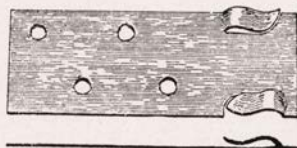
26 gauge, shipping weight, 174 lbs. per 1,000 feet.

24 gauge, shipping weight, 210 lbs. per 1,000 feet.

If it is desired to use clips with this bead, they must be ordered separately.

HUMP CLIP

To use with either the Nemco Corner Bead or Nemco Bull Nose Bead. This clip must be ordered separately. An extra charge is made for them.



SECTION

NEMCO BASE GROUNDS



(HOT GALVANIZED)

Cut about $\frac{1}{2}$ actual size.

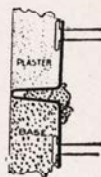
Made for $\frac{1}{2}$ -inch and $\frac{3}{8}$ -inch grounds.

Furnished with clinch holes on both sides without extra charge.

26 gauge, shipping weight, 197 lbs. per 1,000 feet.

24 gauge, shipping weight, 229 lbs. per 1,000 feet.

Right hand sectional cut shows end view.



NEMCO COLD FORMED OR PRESSED STEEL CHANNELS

combine great tensile strength with the advantage of light weight. The legs of these channels are exactly perpendicular to the back thus strengthening the metal and giving greater rigidity to the channel.

NEMCO COLD FORMED CHANNELS are furnished in the following sizes and weights:

Size	Approximate Length of Leg	Gauge	Weight per 1,000 Lineal Ft.
$\frac{3}{4}$ -inch	$\frac{3}{8}$ -inch	16	276
1 -inch	$\frac{3}{8}$ -inch	16	332
$1\frac{1}{2}$ -inch	$\frac{3}{8}$ -inch	16	456

Stock lengths 12 ft., 14 ft., 16 ft., 18 ft. and 20 ft. "Channels 22 ft. long can be furnished on special orders."

$1\frac{1}{2}$ -inch channels are packed 10 pieces to bundle, the $\frac{3}{4}$ and 1-inch sizes, 20 pieces to bundle.

Suggestions for Ordering

When ordering **Nemco Products** in carload quantities, it is well to consider the minimum carload weight applying to your city in order that you may obtain the lowest possible freight rate on your material. Shipments to points located in Official or Western Classification territories must weight 36,000 lbs. or more, and to Southern Classification Territory, 30,000 lbs. or more. The minimum has been changed to 36,000 lbs. Consolidated Classification No. 1, (which, however, at this time has not been officially made effective.) If it becomes effective, 36,000 lbs. will be the standard minimum weight over the entire United States.

Excepting to certain localities, the above minimum carload weights will apply. To Pacific Coast Terminal and Pacific Coast Intermediate points, and to a few points in the Southwest the minimum weight is 40,000 lbs.

In figuring quantities bear in mind that all Nemco products can be mixed in Official Classification territory at the highest rate applicable to any of the articles and at the highest minimum weight of any of the articles. In Western Classification territory, lath, expanded metal and channels can be mixed as stated above, but in Southern Classification territory the only articles that can be mixed are lath and expanded metal.

The class rates that apply on **Nemco Products** are as follows:

On Lath and Expanded Metal.		
Territory	Less than Carloads	Carloads
Official	Fourth Class	Fifth Class
Southern	Fourth Class	Sixth Class
Western	Third Class	Fifth Class
On Channels.		
Territory	Less than Carloads	Carloads
Official	Fourth Class	Fifth Class
Southern	Sixth Class	Special Iron
Western	Fourth Class	Fifth Class
On Corner Bead.		
Territory	Less than Carloads	Carloads
Official	Third Class in bundles	Fifth Class
Official	Fourth Class in boxes or crates	Fifth Class
Southern	Third Class in bundles	Fifth Class
Southern	Fourth Class in boxes or crates	Fifth Class
Western	Second Class in bundles, boxes or crates	Fourth Class

The class rates apply excepting where special commodity rates have been published by the carriers. There are carload commodity rates in effect covering channels in practically all parts of the United States. The commodity rates on lath, expanded metal and corner bead are very few. In Official Classification territory there are no commodity rates excepting channels and the class rates will apply exclusively. To the Pacific Coast and to points in the Southwest commodity rates are in effect, and on shipments to these points the freight charges should be carefully checked.

N. B.—The Northwestern Traffic Dept. will cheerfully render any desired assistance in checking the freight bills of our customers.

